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O'MEARA'S
MEDICAL GUIDE
FOR INDIA AND THE TROPICS

COMPLETELY REVISED
GREATLY ENLARGED

BY

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FIFTH EDITION

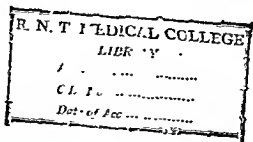
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PREFACE

THE present edition is in many respects a new work. The advent of chemotherapy has made it necessary to re-write most of the sections on treatment, so the opportunity has been taken to add a number of new articles and to put the whole book into alphabetical order.

Among the more important new articles are those on Chemotherapy, Fractures and Dislocations, Infections of the Hand, Mental Diseases, Anaesthetics, Diet, Ear, Nose, Throat, Eye, Heart Disease, Nervous System, Plague, Malaria, Cholera, Pulmonary Tuberculosis, Venereal Disease and Vitamins. Except for Anaemias of Pregnancy and part of Caesarean Section the article on Obstetrics has been entirely re-written, and those on Gynaecology and Simple Laboratory Methods considerably amplified. I have also added a few line drawings and wish I could have done more, but time did not permit.

The Aphorisms may perhaps amuse and instruct the reader; whenever the source is known it has been given, but some are the "wisecracks" of a long-forgotten colleague, teacher or writer, and to some I must plead guilty myself.

I realize that when a single author writes on many subjects he is apt to write better about some than about others, but I hope that no major errors have crept in and that the pleasing individuality of the earlier editions of O'Meara's book has been maintained.

An attractive feature of the book has always been the variety of its information, which ranges from how to deal with a transverse presentation to how much castor oil to give an elephant. I therefore feel that although it was primarily intended for India, it should prove a helpful companion to many a worker in other tropical and subtropical countries.

The Pharmacopoeia which appeared in previous editions has been omitted, partly because dosage and prescriptions are given throughout the book and partly because more space has been devoted to other subjects; furthermore, every medical man has, or should have, a book on *Materia Medica* or a copy of the *British Pharmacopoeia*.

Dosage and certain methods of treatment have been checked up in Martindale's *Extra Pharmacopoeia*, to which I am greatly indebted, and which must surely contain more useful information than any other book of its size.

Lists of references have been omitted because in the tropics it is quite impossible to consult the original articles referred to, but I hope that acknowledgement has been made in all cases where it is due.

Throughout the book I have tried to use simple language and to make the reader see the reason for the methods advocated because I believe that intelligent doctoring should be one long detective story, not a series of unrelated items of information expressed in difficult language and learnt parrot-wise.

If the "Hot Weather" point of view obtrudes itself at times it is because much of the book has been written during the hot summer afternoons and evenings of New Delhi.

I wish to thank Dr. Raja, compiler of the Bhoré Committee Report, for revising the Public Health and Medico-Legal sections, Mrs Bedford, Superintendent of Nursing Services, Bengal, for her help with the Nursing Section, Major B. N. Khan for his article on Diet, Major-General Sir Gordon Scovell for his article on D.D.T., Dr. Simeons and the *Indian Medical Gazette* for permission to include "The Simeons Plan", Lieutenant-Colonel H. V. Mulligan for his article on Rabies, many typists for being able to read my writing, my wife for invaluable help, and the Publishers for their unfailing friendliness and help.

Finally, I wish to thank the Indian Medical Service, which offered wider opportunities for clinical research and a greater chance of doing good to one's fellow creatures than any other organization in the world.

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O'MEARA'S MEDICAL GUIDE

ABORTION—*See Obstetrics.*

ABORTUS FEVER—*See Malta Fever.*

ABSCESS

For treatment of special abscesses, see under the affected organ.

The modern treatment of an abscess is as follows, but when the abscess is "pointing", or materials are not available, the time-honoured treatment by incision and drainage is carried out.

GENERAL TREATMENT.—Give one of the sulphonamides such as sulphathiazole, four tablets (2 grammes) for the first dose and two tablets four-hourly thereafter for four or five days. Intramuscular injections of penicillin (12,500 units, every 3 hours day and night until recovery) are also given when important structures are affected or threatened.

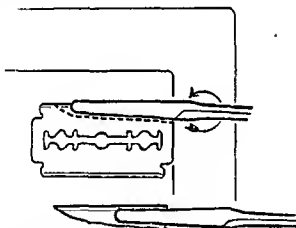


Fig 1 —Method of making a sharp abscess knife

LOCAL TREATMENT OF A DEEP ABSCESS (MODERN).—

The abscess is aspirated through a fairly wide needle, using a local anaesthetic if necessary: it is then washed out with normal saline solution, all of which is allowed to run out; the process may be repeated if the fluid is very thick at first. Enough penicillin sodium solution 5,000 units per c.c. is now injected into the abscess to fill it loosely, but not to distend it. This is repeated every 12 hours for 2 days and every 24 hours thereafter until all signs of active inflammation have disappeared; this is usually in three or four days. A thinner needle is used after the first treatment. If the abscess is not subsiding after three days, or if the necessary materials are not to hand, the abscess should be opened.

ON OPENING ABSCESES.—Where an abscess is deep and amongst vital structures, as in the neck, Hilton's method is the best. Make a small incision through the skin and superficial fascia and then push in a pair of sinus forceps until pus is found; open the forceps and let it out and then insert a soft rubber drain with safety pin attached.

For opening superficial abscesses a knife with a very sharp point will save the patient much pain. An old cataract knife or Bard Parker 11 or 12 does excellently. With the cutting edge facing away from the patient a quick stab is made into the abscess and the knife immediately brought out sharp edge first. If this is done with enough skill and speed the operation is over before the patient realizes that it has begun.

ACHOLURIC JAUNDICE

The best treatment is splenectomy; failing this the case should be treated as for gall-stones.

ACIDOSIS

There are two main varieties, Acidosis and Ketosis, the latter being more common in children.

ACIDOSIS.—This occurs with starvation, diarrhoea and diabetes, and appropriate treatment is given for each. After operation, especially under chloroform anaesthesia, it should be treated as described below under Ketosis.

KETOSIS.—This is common amongst European children in the hot weather and is associated with cyclical vomiting and often with high fever; the stools are pasty and pale and the child may be very ill. These children sometimes develop migraine later.

TREATMENT.—Give glucose and sodium bicarbonate by the mouth or by rectal drip; 2 ounces of glucose and 2 drachms of sod. bicarb. are given in each pint of water. In severe cases the above solution may be given intravenously in doses of 10–100 c.c. Two grains of hyd. cum. cret. should be given each night for four nights. A small dose (10 units) of insulin may be given once a day.

PREVENTION.—Increase carbohydrates and cut down fats; allow only skimmed milk, give very little butter and avoid ghi. It is amazing how these children will put on weight on an almost fat-free diet. A change to the hills often helps.

ACNE AND PIMPLES

DIET.—Cut down fats.

MEDICINES.—Give vitamin B₂. Small (5,000 units) injections of Oestroform once a fortnight may help, and calcium by the mouth can do no harm. An autogenous vaccine may work wonders (or may not).

LOCAL TREATMENT.—Di-Menformon ointment containing also 10% sulphathiazole powder is the most effective local

application. If Di-Menformon ointment is unobtainable use Cibazol or other sulphathiazole ointment. The affected area should be washed with hot water and soap and then sponged with alcohol before the ointment is applied.

X-RAYS.—These may help and should be given in small doses by a skilled radiologist.

ACRODYNIA—See Pink Disease.

ACROMEGALY

In many cases the arrest of the disease is spontaneous. Operation for removal of the enlarged pituitary is formidable, but is indicated if eyesight is threatened. Side effects such as hypothyroidism, impotence or amenorrhoea may be treated by injection of the appropriate gland extracts. Deep X-ray therapy gives the most promising results and is the treatment of choice.

ACTINOMYCOSIS

GENERAL TREATMENT.—Penicillin and sulphathiazole are given in full doses. The old treatment was to give pot. iod. one drachm t.d.s.

LOCAL TREATMENT.—Sinuses should be excised where possible, or scraped.

ACUTE YELLOW ATROPHY OF THE LIVER—See Liver, Acute Necrosis of.

ADDISON'S DISEASE

Injections of cortical extract are efficient but costly, and are often painful.

The synthetic desoxycorticosterone or its acetate is just as effective in most cases and is given intramuscularly in 5–10 mg. doses. A few patients get a severe local reaction, in which case about 500 mg. in sterile tablets may be inserted under the skin with local anaesthesia. This lasts for about 6 months.

Equally important is a high salt intake, which is often sufficient to relieve mild cases, or to maintain others in good health after a course of desoxycorticosterone. Patients with Addison's disease are particularly liable to infections of all sorts, so precautions must be taken to guard against them.

ADENOIDS—See Tonsils.

AGRANULOCYTOSIS

This is the absence of granular leucocytes—i.e., polymorphs and eosinophils.

This may occur after amidopyrine (Pyramidon), after gold injections and after sulphonamide therapy has been employed for ten days or longer.

Sloughing pharyngitis is the commonest symptom, often accompanied by stomatitis or gingivitis; occasionally proctitis or vaginitis may be the leading symptom.

These symptoms must, therefore, be watched for in patients taking the drugs mentioned above.

PROPHYLAXIS.—Never give amidopyrine over long periods; aspirin and phenacetin are equally effective.

Do weekly blood examinations of all patients having gold treatment.

Do not give sulphonamides for more than 8 days in succession.

TREATMENT.—Stop the drug.

Examine the blood.

Give a daily intramuscular injection of 10 c.c. pentose-nucleotide with 2 c.c. whole liver extract for 10 days. Sometimes alarming symptoms of praecordial distress occur, so the first dose of pentose-nucleotide should be 5 c.c.

AIR PASSAGES AND OESOPHAGUS—FOREIGN BODIES IN

Pain after swallowing a foreign body frequently only means an abrasion of the mucous membrane, but the finding of a wound does not necessarily negative the presence of an impacted body elsewhere. If the wound is so severe as to explain the symptoms, then it should be treated by the sipping of hydrogen peroxide 3 vol. strength in teaspoonful doses hourly.

It is well known that the ability of a patient to localize the position of a wound or foreign body in the throat is very imperfect, and affords no reliable guide. The tonsil is the most frequent seat of impaction of small sharp bodies such as pins or fish bones; here palpation is delusive and careful examination with good illumination is essential, which also enables the body to be seized with certainty and precision at the outset. As regards the nature and seat of impaction of the body reliance should be placed on: (1) The history. (2) Ocular or Digital examination. (3) Radioscopic findings.

Holding a child upside down, thumping his back and making him cough will often dislodge a foreign body, especially if helped by a finger. Doubt about whether a foreign body is in the oesophagus or the trachea can often be settled by its size and shape; there is not enough room in the trachea for a rupee or a toothplate. Unless the surgeon has special experience, a general anaesthetic is usually advisable for the removal of foreign bodies whatever the method employed.

COIN CATCHER.—This old-fashioned instrument is most valuable in skilled hands and perfectly safe when used with X-rays; even without them it is often successful because a coin usually sticks behind the cricoid cartilage, where it can often be felt and whence it can be expeditiously removed.

BRONCHOSCOPE; DIRECT LARYNGOSCOPE.—Considerable skill is needed in passing these instruments, the main points in their introduction being that:

- (a) The patient's head must be over the end of the table, held in a hyperextended position by the assistant or the anaesthetist, and adjusted as required.

- (b) The patient's upper lip must not be allowed to get between his teeth and the instrument.
- (c) The instrument must be passed visually, not by "feel".
- (d) The epiglottis must be clearly seen and the instrument passed over and then behind it.
- (e) Force must never be used; if it is difficult to move the instrument it is because the patient's teeth are gripping it.
- (f) The tongue must be pulled well forward to open the larynx, otherwise the instrument finds its way into the oesophagus.

Special forceps and other instruments are provided for the various manipulations, but it is really an instrument for the specialist, the greatest of whom live in Philadelphia (U.S.A.).

The beginner will find it much easier to pass a bronchoscope through a tracheotomy opening, the great thing being to "use your eyes". In other words, mucus, blood and pus must be aspirated or swabbed out, and care must be taken not to push a foreign body downwards as the instrument goes deeper. Often there is no history to suggest a foreign body in a bronchus, but it may be suspected in unilateral emphysema, bronchiectasis, atelectasis or abscess.

In India the direct laryngoscope is very useful for the removal of a leech from the larynx, where it is liable to lodge if the patient drinks irrigation water out of his hand, as is often done in country districts. Chloroform facilitates removal by anaesthetizing both the patient and the leech.

OESOPHAGOSCOPE.—Paragraphs (a) to (d) above apply, but the instrument is generally passed down the right side of the tongue and is kept in contact with the posterior wall of the pharynx.

The main resistance is encountered at the cricopharyngeus muscle, behind the lower edge of the cricoid cartilage (where foreign bodies are often held up). This may be overcome by gentle pressure or by passing a small bougie through the oesophagoscope. Should a foreign body be pushed or pass by itself through the pylorus it will generally pass through the anus in due course, which is anything up to six days. Generous doses of liquid paraffin, Petrolagar, Agarol or Normacol will help it on its way. If it has not passed at the end of a week, laparotomy will probably be needed; even if there are no symptoms, perforation of the gut is likely to occur in time.

X-ray pictures are taken to confirm the presence and show the situation of the foreign body.

Laparotomy is required in all cases with signs of perforation, or when the object is of a jagged nature, like a toothplate with hooks. Pins and nails generally pass through (70%) but are dangerous because they can easily perforate the gut.

In the case of an open safety-pin, point upwards, in the oesophagus it is safer for the ordinary surgeon to push it into the stomach and remove it by gastrotomy.

The operation of lateral oesophagotomy is by no means difficult, specially when the foreign body, such as a toothplate, can be

palpated. It is advised when an oesophagoscope is not available or when the foreign body is so large that it would be dangerous to drag it up or push it down. There is no urgency about removing foreign bodies unless the patient is having urgent symptoms.

Many years ago, a wise old surgeon of the writer's acquaintance was asked to remove a foreign body from a girl's abdomen, X-ray pictures indicating that it was probably in the terminal ileum. When the patient was anaesthetized and put on the table he said, "Rutherford will go in the old, old way." Inserting two fingers, he thereupon removed the foreign body from the vagina.

AIR SICKNESS

For any form of travel sickness the following prescription is most successful; it is advisable only for short journeys, because obviously a person should not take a comparatively large dose of hyoscine for several days on end. The remedy takes about half an hour to act and its effect lasts for 6-8 hours.

R Hyoscine Hydrobromide	..	gr. $\frac{1}{10}$
Phenobarbitone (Gardenal, Luminal)	..	gr. $\frac{1}{2}$
Chlorbutol (Chloretone)	..	gr. 5
Benzadrine Sulphate (Amphetamine)	..	gr. $\frac{1}{2}$ (5 mg.)
Ft capsule.		

Sig. One to be taken half an hour before the journey, and repeated after 6 hours if necessary.
Not more than two to be taken in 24 hours.

ALBUMINURIA

In the absence of kidney disease, albuminuria occurs:

(a) In healthy young men after exercise. This is of no significance.

(b) "Orthostatic Albuminuria" occurs in weedy youths of about "matric" age. Albumin is absent after resting, so if it is found in an ambulatory specimen, the result should be checked up by examination of a specimen passed first thing in the morning. If this shows albumin, inquiries should be made about nocturnal emissions and the specimen examined under the microscope. If there is no albumin in the early morning specimen, orthostatic albuminuria is present. Calcium lactate and general tonic treatment—of which fresh food, fresh air and reasonable exercise are the chief components—are prescribed. If the patient is of a nervous, introspective type, bromides may be helpful. There may be some hyaline casts, but if the albuminuria is found only after the patient has been moving about and there are no other kinds of cast these may be disregarded. In every case it is advisable to test the urine from time to time, and the blood-pressure is of course taken at the first examination.

Non-nephritic albuminuria also occurs in many fevers and in congestive heart failure.

The following common drugs can injure the kidneys and cause albuminuria: cantharides, carbolic acid, turpentine and other volatile oils, and perchloride of mercury.

ALCOHOL—See Drugs.

ALCOHOLISM—See Mental Diseases.

ALLERGY (See also *Anaphylaxis and Specific Therapy*.)

In response to a stimulus which would not affect a normal person, certain people have an inborn tendency to the local or widespread exudation of fluid into the tissues. The cause seems to be histamine or a histamine-like substance ("H" substance) which may be either present in the irritant or, more commonly, liberated by the cells in response to its stimulus. Certain proteins are the commonest irritants but all kinds of things as widely apart as aspirin, iodine and anger, can cause the condition. Allergy plays a large part in the defences of the body, such as some forms of inflammation, where it is an evident attempt to wash away the invader. Previous sensitization, as in serum rashes and adolescent tuberculosis, makes the phenomenon much more likely to occur. Common examples of allergy are (1) hay fever and asthma in the respiratory system; (2) Henoch's purpura and certain forms of diarrhoea in the alimentary canal; (3) urticaria, angio-neurotic oedema and certain forms of eczema in the skin; and (4) the joint effusions so commonly associated with serum rashes. Some authorities consider that nephritis is an allergic response of the kidneys to the excretion of streptococcal toxins generated in the throat.

TREATMENT.—Until histaminase, which apparently controls the formation of histamine, is isolated, adrenaline (preferably in oil, because its effect lasts for 6–8 hours) and calcium are the best remedies. Calcium may be given intravenously, intramuscularly or by the mouth, according to the severity of the symptoms. Carefully graduated doses of Hapamine, given according to the pamphlet accompanying the bottle, form a modern and very successful method of treatment.

After any allergic attack it is advisable to give a saline purge and whenever possible to guard against a repetition of the causative stimulus.

ALOPECIA AREATA

The cause is unknown. It is diagnosed by the typical shape of the hairs, which is that of an exclamation mark without the dot. Extreme scurfiness of the head produces a similar condition, as also does ringworm, but the scurf and *Tinea* respectively distinguish them. Alopecia areata has never been proved to be infectious, and unless widespread, usually cures itself within a year.

TREATMENT.—This is to cause local hyperaemia.

The following methods are in common use:

Ultra-violet rays or sunlight, daily.

Pure carbolic acid, washed off at once with spirit, once a week.

Strong iodine or 25% lactic acid in spirit, daily, but these methods are painful and must not be overdone.

An ointment of resorcin and acetum cantharidis, a drachm of each to an ounce of Vaseline, may be rubbed in twice daily.

Septic foci must be attended to and large doses of vitamin A given; the latter sometimes has a dramatic effect.

AMOEBIASIS, AMOEBIC ABSCESS—See Dysentery; Hepatitis.

AMPUTATIONS

"One law for the rich and another for the poor" is true of amputations. It is amazing what the well-to-do educated patient can do with a modern artificial leg (arms and hands are not so successful); but the leg is expensive and needs keeping in good order, lubrication, replacement of worn parts, and periodical refitting. Such things are irksome or impossible for a poor villager, who generally prefers a home-made prosthesis, consisting of a wooden crutch with a small platform attached, on which he kneels or sits, while for the upper limb he uses nothing at all. In the case of a double leg amputation the victim often prefers to be drawn along in a small cart, begging alms of the passers-by, or even to walk on his hands. Further, artificial limbs are hot to wear, and in a hot climate eczema and prickly heat are apt to occur with dolorous frequency.

A good example is the badly crushed foot; in Western countries most surgeons will amputate below the knee, because the modern artificial leg gives much better locomotion than the artificial foot, but a villager will be much better off with a Syme's or Pirogoff's amputation, because it gives him a stump on which he can walk.

PRINCIPLES.—

- (1) A limb can generally be saved if the main vessels are intact.
- (2) In the upper limb, preserve all you can; half a thumb is better than any artificial hand. In the lower limb, make it suitable for that particular patient to walk on.
- (3) Scatter sulphathiazole with 1% flavine powder (e.g., Cibazol) on the raw surfaces before sewing up.
- (4) Amputation within six hours of injury can be safely sewn up.
- (5) After six hours and before the advent of frank sepsis, cut flaps, but approximate them loosely. With luck and adequate chemotherapy they can be sewn up a week or two later.
- (6) In septic cases, cut the skin at least an inch below the "guillotine" amputation, and put traction on the skin with Elastoplast and weights.
- (7) Attend carefully to haemostasis (this is perhaps the most important rule). Drain a major amputation for 48 hours and put on a firm dressing. Haematoma is the commonest cause of a weak scar.
- (8) Sites of election are so-called for two reasons; the stump is the best for an artificial limb and the blood circulation in it is good.

These sites are as follows (Langdale-Kelham and Perkins).

Leg.—4 inches and 10½ inches below the upper edge of the great trochanter; 5½ inches below the upper end of the tibia.

Arm.—4 inches and 8 inches below the tip of the acromion.
7 inches below the tip of the olecranon.

- (9) Make flaps of equal length in the upper limb, and also below the knee, where the hamstrings draw the scar backwards. In

the thigh, the anterior flap should be longer than the posterior, but there should be no puckering or tension.

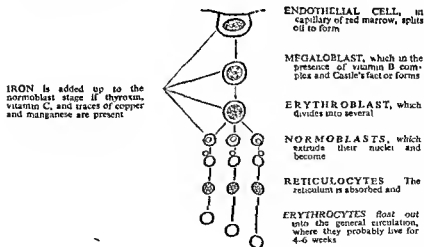
- (10) The end of a bone should be covered by skin and subcutaneous fat only; muscles should not be sewn over it, but the skin must be healthy and mobile. (Consider such natural points of pressure as the patella, the heel and the olecranon, which are covered only by skin and subcutaneous fat.)
- (11) A transverse scar is always better than an antero-posterior one.
- (12) Bone and periosteum should be divided at the same level, except in the fibula and ulna, where the periosteum is stripped up for an inch to avoid cross-union.
- (13) Nerves should be drawn down gently or dissected out and cut with a sharp knife; they should not be crushed, ligated or injected.
- (14) A tourniquet must be removed as soon as the main vessels are tied.

ANAEMIA

Primary anaemia is due to inadequate blood formation; secondary anaemia to excessive blood destruction or loss.

THE PRIMARY ANAEMIAS

The causation and treatment will be best understood from a contemplation of how blood cells are formed, which is as shown in the diagram. From this it will be seen that in the absence of



Castle's factor, which exists in the liver, there is trouble in reaching the erythroblast stage; now this is the cell which divides up to form normoblasts, so in pernicious anaemia one would expect to find numerous large cells in the circulation, which is exactly what is

found—one name for pernicious anaemia being megalocytic anaemia.

On the other hand, if the cells divide but do not get their proper allowance of iron, they tend to be less numerous—normocytic anaemia, or both less numerous and smaller—microcytic anaemia.

Therefore, we treat the megalocytic anaemias, which include pernicious anaemia, sprue and anaemia of pregnancy, with liver extract and vitamin B, together with iron, because it is so often deficient in the Indian diet. In the rare *Dibothriocephalus latus* anaemia the tapeworm must, of course, be destroyed first. The normocytic and microcytic anaemias we treat with ferrous iron, generally in the form of ferrous sulphate gr. 3 t.d.s.p.c.

To tell quite simply whether anaemia is megalocytic or microcytic it is only necessary to do a red-cell count and a haemoglobin estimation. The percentage of haemoglobin divided by the percentage of red cells is the colour index. If this is greater than one the anaemia is megalocytic, if it is one, the anaemia is normocytic, and if less than one, microcytic. For instance, the red-cell count is 2,785,000 and the haemoglobin is 80%: to calculate the percentage of red cells, multiply by 2 and put a decimal point before the last five figures; the percentage is therefore 55·7; 80 divided by 55·7 is 1·44; the disease is megalocytic anaemia and liver injections are required. Chlorosis is a primary microcytic anaemia, often with achlorhydria, and affects constipated virgins, so it is rare in India, but the similar nutritional anaemia is very common indeed; its frequency is due not so much to actual lack of food as to lack of iron in the food that is eaten; there is a slight amount of iron in corn, but there is far more in meat.

Anaemia of pregnancy can be of either type, depending upon whether there is shortage of iron or a tendency to pernicious anaemia or sprue. Sometimes both factors come into play, so these cases are treated with both liver and iron.

All very severe anaemias benefit from a blood transfusion.

Aplastic anaemia, in which the red marrow stops forming red cells, follows over-exposure to X-rays, radium, or the emanations of the atomic bomb. It also occurs after chronic poisoning with benzol, T.N.T. and the sulphonamides. Occasionally, it has followed severe infectious such as measles and typhoid, especially in children, but in many cases the cause is unknown. The only treatment is by repeated blood transfusions, after which the marrow has been known to resume work.

THE SECONDARY ANAEMIAS

Blood destruction can be caused by some error in the bodily mechanism, as in acholuric jaundice, in which it is due to an increased fragility of the red cells, or in the hereditary sickle-celled anaemia, which affects American negroes.

Much commoner than these, especially in India, are certain infections, of which hookworm disease (*Ankylostoma duodenale*) and malaria are by far the most important. In fact, it may be said

that these two diseases, coupled with malnutrition, are responsible for 90% of the anaemia in India; it might almost be added that 90% of the poorer classes are anaemic. Other blood-destroying diseases are tubercle (often unsuspected) kala-azar, bilharzia and filaria.

In cases of anaemia, therefore, *not only the blood, but the stools, the urine and the sputum should be examined, treatment depending upon the cause.*

Sudden and severe loss of blood, from injury or internal haemorrhage, is obvious, but a long-continued loss from a gastric or intestinal carcinoma, and, far more commonly, from piles or uterine disorders, may require careful history taking and examination before it is discovered.

ANAESTHESIA

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GENERAL ANAESTHESIA

It is easier for the anaesthetist to kill the patient than for the surgeon.

The essentials of a good anaesthetic are :

- (1) A quiet induction.
- (2) A clear airway.
- (3) A perfect knowledge of how "deep" the patient is.
- (4) Perfect co-operation between anaesthetist and surgeon.

QUIET INDUCTION

The days when a screaming, struggling patient was held down on a table in an operation room filled with imaginary horrors which became more real with every suffocating breath are, we hope, gone for ever.

Further, a patient who begins by breathing and behaving badly is likely to do so throughout the operation, which, therefore, may have to be done hurriedly and imperfectly.

The secret of a quiet induction is good premedication; as this need never take more than an hour and a half and can be achieved in five minutes, there is no excuse for omitting it.

PREMEDICATION

The writer's usual routine in an ordinary abdominal case is as follows:

(a) Evening before operation (bath, skin preparation):

Light meal, containing plenty of sugar.

It is an advantage for the anaesthetist to see the patient about this time.

8 p.m. "Mist. 3/15's" one ounce (i.e., pot. bromide gr. 15, chloral hydrate gr. 15, tinct. opii m. 15). Alternatively, one of the barbiturates—e.g., Luminal (Gardenal, phenobarbitone) gr. 3, or Medinal gr. $7\frac{1}{2}$ —may be given.

(b) Morning of operation:

7.00 a.m. Hot tea with milk and sugar.

7.30 a.m. 1 c.c. of Pituitrin or Pitressin.

7.45 a.m. Simple enema.

Before any narcotic is given, false teeth, if present, are removed.

1–1½ hours before operation.

Hyoscine gr. $\frac{1}{100}$, Morphia gr. $\frac{1}{4}$.

Amytal Sodium gr. 3 by mouth.

(Hyoscine and morphia exercise their best effect, namely, of drying up secretions and calming the patient, when given in the proportion of 1 : 25.)

Atropin. sulphate gr. $\frac{1}{100}$ may be added, but it is not essential, and is contra-indicated in hot weather.

(c) 15 minutes before operation:

The patient, who is quite "dopey", is given about half a normal dose of one of the intravenous anaesthetics (see page 21).

(d) 10 minutes before operation:

The patient is put on the trolley and taken to the theatre.

In an urgent case the hyoscine and morphia may be omitted, the dose of intravenous anaesthetic being increased by 50 or 100 per cent.

If an intravenous anaesthetic is unobtainable, it must, of course, be omitted, but the hyoscine and morphia should be given as above at least half an hour before operation.

NOTE ON PREMEDICATION AND THE PUPIL.—Atropine and hyoscine (scopolamine) dilate the pupil, while morphia, Omnopon and the other opium derivatives make it contract, so the net result of mixing one group with the other is not very marked. Ethyl chloride, which is sometimes used for a quick induction or a short operation, dilates the pupil during stages 1 and 2.

By the time stage 3 (surgical anaesthesia) is reached the pupil should be contracted, whatever the anaesthetic used, unless it is plain "gas" for a minor operation.

It may be taken as a general rule that a contracted pupil means safety.

Before the patient arrives at the theatre, a word or two about the anaesthetist's equipment.

EQUIPMENT.—Apart from masks, special apparatus and bottles of anaesthetics, the following must be ready for instantaneous use. In an emergency, the loss of a minute may mean the loss of a life.

- (a) A cylinder of carbon dioxide, checked to see that it is charged, or a "Sparklet" resuscitator in working order.
- (b) A cylinder of oxygen.

Cylinders must be clearly marked and have rubber tubes attached (*without* a bottle of water for the gas to bubble through), red for oxygen and green or some other colour for CO_2 . Cylinders must not be in a narrow vertical stand, which can be easily upset; a panicky assistant once nearly blew himself, the patient and everyone else in the theatre, including the writer, to Kingdom Come by knocking over a charged oxygen cylinder.

- (c) A mouth gag.
- (d) A tongue forceps.
- (e) An artificial airway.
- (f) A sterilized 2 c.c. syringe in spirit with several needles.
- (g) A bottle of iodine and some cotton-wool.
- (h) Ampoules of
 - (1) Coramine (nikethamide) or Cardiazol (heart stimulants).
 - (2) Lobeline (respiratory stimulant).
 - (3) Methedrine, Phedracine or ephedrine (for raising blood pressure).
 - (4) Pituitrin (rapid general stimulant).
 - (5) Adrenaline (for injection into the heart in case of cardiac arrest).

THE OPEN METHOD

INDUCTION.—Apart from General Hospitals with specialists, and often there too, induction in India is usually carried out with chloroform, or in the case of children, with chloroform and ether mixture (two parts of chloroform to three of ether— C_2H_6) on an open mask, and it may be said at once that if the instructions given in the last section are strictly adhered to, the anaesthetist has little to fear, while if a tube delivering a gentle stream of oxygen is kept under the mask throughout the operation, he has still less to fear.

The patient's nose, cheeks and chin having been smeared with Vaseline, the anaesthetic is dropped on a Schimmelbusch mask covered with two layers of flannel. It is an advantage always to use the same covering, because the anaesthetist then has a good and uniform idea of how much vapour the patient is getting. Flannel is better than lint or gauze because the former gets sodden and the latter may allow drops of chloroform to fall through, but either may be used if preferred or if flannel is unobtainable.

Administration should be even, not jerky, and at the very beginning it is better to hold the mask away from the face.

If ether is to be given, a layer of cotton wool, with a hole for the mouth and nose, is laid on the face under the mask. Otherwise a

sufficient concentration of vapour cannot be achieved. The cotton-wool can be put on either at the beginning or later, but if it is put on at the beginning, chloroform must be used very sparingly and not more than half the mask should be wet with the drug, as this gives a concentration of about 3%.

THE DEPTH OF ANAESTHESIA.—An anaesthetist who does not know how "deep" his patient is, is like a man-eating tiger; he is bound to kill somebody unless somebody kills him first.

Anaesthesia is divided into four stages:

- (1) Analgesia
- (2) Light Anaesthesia (Excitement).
- (3) Surgical Anaesthesia.
- (4) Overdose.

When chloroform is being given, no matter how impatient the surgeon may be, no surgical procedure of any kind should be permitted until the patient has settled down and is breathing regularly and automatically. The best anaesthetist the writer ever knew was called "Safety" Davis; he always needed 20 minutes for induction and he never lost a patient.

The most distressing cases are those in which, because the operation is a minor one, probably on a child, it is begun too soon, the heart gets irritated and goes into ventricular fibrillation, which means sudden death. The reason is not known properly; perhaps, because the patient can still feel, there is a sudden rush of adrenaline into the circulation, which in combination with chloroform is known to produce ventricular fibrillation; perhaps it is due to vagus inhibition, but whatever the cause, it is a very serious drawback to chloroform. Status lymphaticus will be discussed later under "Complications and Disasters".

If premedication has been adequate, as it should have been, Stages 1 and 2 will not be very distinct; they blend into Stage 3.

Stage 1—Analgesia

The patient is rather "drunk"; he soon becomes disorientated, but generally lies quite quietly and breathes normally. The eyes are turned upwards, the pupils may be dilated, they react to light and the corneal reflex is brisk. The face retains the tone and expression of a person asleep.

Stage 2—Light Anaesthesia

This is the so-called stage of excitement which should never be seen if premedication has been good. It is the stage in which patients, as the clouds of vapour overwhelm their conscious control, "see things and say things"; they may also vomit.

If these things happen, it is safer to let the patient out a little than to force him further under the anaesthetic.

Two complications must be specially guarded against; a colossal inhalation of anaesthetic after a period of holding the breath, and the entry of vomited matter into the larynx. The former is prevented by removing the mask when the patient holds his breath and giving

him a whiff of CO_2 instead of chloroform, while the latter is avoided by turning the face right over and swabbing out the pharynx; this is not always easy, but a gag can be quickly inserted as the patient opens his mouth to vomit, or the cleached teeth can be separated by a wedge sufficiently to admit a gag.

As soon as the patient becomes more peaceful the anaesthetic should be given in a stronger dose.

The pupils may be dilated or contracted, but, more important, the eyes move about; normally, the conjunctival and corneal reflexes are present, but if there is any degree of asphyxia they may be temporarily absent, which may make the anaesthetist think that the patient is deeply into Stage 3—another reminder that the breathing is the thing to watch.

Stage 3—Surgical Anaesthesia

As this stage is entered, the character of the respiration, the expression of the face and the condition of the eyes all undergo a change.

The respiration becomes regular and stertorous and has an unmistakable automatic character.

KEEPING A CLEAR AIRWAY.—As soon as the jaw relaxes the anaesthetist opens the patient's mouth and with a thumb behind each angle of the jaw he pushes it well forward; the mouth is now closed with the lower teeth in front of the upper, and they are kept in this position by the fingers of the right hand, which are under the chin, while the thumb and first finger hold the mask. The drop bottle is manipulated by the left hand. Some anaesthetists keep the tongue forward with a tongue forceps; this is undesirable.

If there is any difficulty in maintaining a clear airway, or in all cases when the anaesthetist prefers it, a Hewitt's airway, or, better, a Waters' all-metal airway is inserted; a set of Waters' airways is a good investment as they save endless trouble. An intra-tracheal tube is the best, but is a method for the specialist.

FACIAL EXPRESSION.—This is seldom mentioned, but is a most valuable sign and a shrewd observer can tell at a glance whether a patient is asleep or anaesthetized. As the jaw relaxes, so do the other muscles of the face, which assumes a completely expressionless look, quite unlike the more human expression of sleep.

PUPILS.—As the patient enters the stage of full surgical anaesthesia the pupils of the eyes, from being turned up or restless, become fixed, and stare straight ahead. In safe surgical anaesthesia the pupils are contracted, but as anaesthesia deepens they dilate; for complete relaxation of the abdominal muscles it is generally necessary to keep the patient at the stage where the pupils are just beginning to dilate. Anything like wide dilatation is a sign of extreme danger; the anaesthetic must be stopped at once.

RESPIRATION.—The automatic character has already been mentioned, but an interesting and very valuable phenomenon is that, as anaesthesia deepens, thoracic (intercostal) respiration

ceases before diaphragmatic; thus we have another valuable danger sign—cessation of thoracic respiration.

COLOUR OF THE PATIENT.—This is not so easy to judge with Eastern races as with Western, but cyanosis, the first sign of asphyxia, can always be observed in the lips or conjunctivae. With a good anaesthetic the colour should be a healthy natural pink. The colour is best with ether.

MUSCULAR RELAXATION.—This varies with different anaesthetics and with different patients, but is a necessity for the performance of an abdominal operation. A spinal anaesthetic gives the best relaxation of all, next in order come chloroform, divinyl ether, ether, cyclopropane, ethylene, Trilene, nitrous oxide, ethyl chloride (variable) and the intravenous barbiturates.

Even with chloroform and ether good relaxation will never be obtained without a good airway.

"WASHING OUT THE ANAESTHETIC".—As the surgeon puts in the last stitch, the carbon dioxide should be turned on; this causes deep breathing, which should be allowed to continue for several minutes, while the dressings, etc., are arranged; by this means an appreciable quantity of the anaesthetic is "washed out" of the patient's blood, which greatly lessens post-operative vomiting.

COMPLICATIONS AND DISASTERS.—The complications of vomiting in the second stage and difficulty in keeping a clear airway have already been discussed.

ETHER CONVULSIONS

These are very rare with open methods, lack of oxygen being one of the causes; others probably are sepsis, fever, a hot theatre, atropine and a young patient. Treatment consists in stopping ether at once, raising the patient's head and giving oxygen, Coramine, and about 2-5 c.c. of one of the intravenous anaesthetics. Several fatal cases have been reported.

Disasters are respiratory and circulatory failure, the latter, of course, being far the more serious.

If a patient stops breathing at the beginning of an operation, he generally recovers, but if he stops at the end he generally dies.

RESPIRATORY FAILURE

This has two main causes.

BAD AIRWAY—The patient goes on struggling to get air into his chest and gets more and more cyanosed until finally his respiratory muscles give up the struggle; if his heart muscle is diseased, or the right heart very congested, it may give up the struggle too.

OVERDOSE.—This may happen in three ways, through inadvertence, ignorance, or attempts to get a rigid or struggling patient quickly under. The first can be avoided by care, the second by study and experience, and the third by premedication, and a refusal to be panicked by a troublesome patient or surgeon.

It has already been pointed out that the intercostal respiration diminishes and stops before the diaphragmatic, so any suspicion that this is occurring means removal of the mask.

TREATMENT.—

- (a) Make certain that the airway is clear by swabbing behind the epiglottis, and by inserting an artificial airway or pressing the jaw forward and pulling out the tongue. An ordinary sharp towel clip passed through the tongue about half an inch from the tip causes less damage than do most tongue forceps.
- (b) Lower the patient's head. If the table can be tilted, the head end should be lowered about five degrees—not more—because the already embarrassed heart must not be overfilled.
- (c) Turn on the CO₂ and oxygen.
- (d) Do artificial respiration by Sylvester's method, which is carried out as follows:

Standing behind the patient's head, take hold of his forearms just below the elbows. Lift his arms so that the elbows nearly meet behind his head.

Count three.

Lower his arms and press his elbows against the sides of his chest.

Count three.

Repeat the process until breathing is established.

Counting three gives time for the chest to fill or empty and ensures that the manoeuvre is carried out about 18 times a minute, which is the correct speed. Muscular performers must take care not to break the patient's ribs.

- (e) Meanwhile an assistant gives an injection of lobeline and Cornamine.

CIRCULATORY FAILURE

If, before or during the above treatment, there is *any doubt at all* whether the heart is beating, stop everything and make sure.

If it is not, do not waste any time doing artificial respiration, pulling out the patient's tongue or fiddling about with injections, but concentrate on restarting the heart.

- (a) Thrust a surgical or hypodermic needle into the heart through the 3rd or 4th left interspace, about half an inch lateral to the edge of the sternum. It is an advantage for the needle to be used as a means of injecting 1 c.c. of adrenaline into the heart, but do not waste time in finding adrenaline and sterilizing a syringe because the patient may die permanently meanwhile and because in most cases it is the prick of the needle, not the injection of adrenaline, that stimulates the heart to start beating.
- (b) If the heart does not start beating within fifteen seconds it must be massaged, *and the sooner this is begun the more often will it save life.*
- (c) Quickly swab the right hand with alcohol, Dettol or iodine, or put on a sterile glove. If there is not already an abdominal

NITROUS OXIDE GAS (N_2O).—Gas and oxygen, with one or more of the other anaesthetics added, is the method most used by the specialist, and in his hands it approaches perfection, but it requires special knowledge and complicated apparatus, so, as already remarked, will not be described here.

The ordinary gas apparatus for use in short operations, such as dental extractions and opening of abscesses, consists of four parts:

A closely fitting face-piece.

A three-way valve.

A bag.

Coupled cylinders with foot-operated tap connected by a rubber tube to the bag.

Three precautions are necessary before use; the anaesthetist must assure himself that both cylinders are charged with gas and that one is full, he must familiarize himself thoroughly with the three-way valve, and thirdly, he must not give gas to a patient with high blood-pressure, or a heavy purplish complexion.

THE THREE-WAY VALVE.—This permits the patient:

(a) To breathe air (labelled "AIR").

(b) To breathe gas and exhale it through the valve into the open air (labelled "VALVES").

(c) To breathe gas and exhale it into the bag; rebreathing (labelled "NO VALVES").

The original Hewitt valve produces the same results but by a slightly different method.

DEPTH OF ANAESTHESIA.—With gas the signs are not the same as with other anaesthetics.

The pupil dilates early, and remains dilated throughout; the corneal reflex is not abolished—if it is, the patient is in danger. As with other anaesthetics, the eyes move about in the early stages; when they become fixed surgical anaesthesia has been reached. *Respiration* becomes faster and more stertorous as anaesthesia deepens. The curious phenomenon of jactitation is a sign of full anaesthesia, the patient gives unmistakable jerks and seems to catch his breath suddenly with each inspiration. The mask must be removed at once and the operation begun.

COLOUR.—The patient rapidly becomes cyanotic as the nitrous oxide displaces the oxygen in the blood; a further point of interest is that blood does not readily part with its oxygen unless CO_2 is also present. It is, therefore, necessary to allow a considerable amount of rebreathing ("NO VALVES"), otherwise the patient loses all his CO_2 into the atmosphere ("VALVES") and becomes asphyxiated from lack of oxygen in the tissues.

METHOD.—

(1) Make sure that the face piece fits, that at least one cylinder is full and that the apparatus does not leak.

(2) If false teeth are present, remove them.

- (3) If a dental or throat operation is to be done, put the mouth prop in position.
- (4) Turn the valve to "AIR".
- (5) Gently open the foot tap, fill the bag with gas and close the foot tap. (If this is done first, it avoids the alarming roar of gas entering the bag when the mask is first applied to the patient's face.)
- (6) Apply the mask to the patient's face and let him breathe air calmly for a few breaths.
- (7) Turn the tap to "VALVES"; the patient now inhales pure gas and breathes out into the open air. Open the foot tap a little, so as to replace the gas.
- (8) Open the foot tap enough to cause slight distension of the bag.
- (9) Turn to "NO VALVES" and allow the patient to rebreathe into the bag.
- (10) As soon as the patient jactitates remove the mask.

If at any time cyanosis becomes excessive give the patient "AIR". One or two breaths of "AIR" during induction also help to prolong the anaesthesia, so it is quite a good thing to make a routine of giving it. If a sudden switch is made from "VALVES" to "AIR" the foot tap must be closed at once or the bag will burst. If the gas shows signs of giving out the patient must rebreathe into the bag ("NO VALVES"). Complications and disasters are due to anoxaemia or asphyxia, so a cylinder of oxygen and one of carbon dioxide are kept ready.

INTRAVENOUS ANAESTHETICS

Sodium Evipan (Cyclonal Sodium, hexobarbitone) and Sodium Pentothal are the two drugs chiefly used; individual tastes differ, but the writer prefers hexobarbitone for two reasons: it appears to be more constant in its action, most adult patients taking one gramme comfortably and remaining "under" for 15 or 20 minutes; secondly, hexobarbitone is non-irritating, so if some of it escapes into the tissues there is no local inflammation as with Pentothal. Several cases of gangrene, necessitating amputation, have been recorded as the result of injection of intravenous anaesthetics into an artery instead of a vein; the sign that this rare misfortune has occurred is a burning sensation distal to the puncture; the injection must of course be stopped at once. The usual full single dose of hexobarbitone is one gramme in 10 c.c. of distilled water; the dose of Pentothal is 0.5 gramme, but as solutions stronger than 5% (i.e., 0.5 gramme in less than 10 c.c.) may cause venous thrombosis it is usually given in 20 c.c., i.e., 2½% solution; more than one gramme of Pentothal must never be given at one sitting.

Premedication with morphia and byoscine may be carried out, but is not necessary, and at least 45 minutes must elapse between the premedication and the intravenous anaesthetic, the dose of which can often be reduced.

For details of giving an intravenous injection, see Intravenous Injections.

Method of Administration.—Ten c.c. of 10% hexobarbitone or 20 c.c. of 2½% Pentothal are drawn up into the appropriate syringe, the air is expelled, the needle introduced into the vein, and the tourniquet or hand pressure removed.

The writer's practice is to inject 2 c.c. of hexobarbitone solution straight away; this generally puts the patient to sleep in a few seconds.

One of the first effects of intravenous barbiturates is to depress the respiration, which becomes shallow or even stops for a few moments, so a halt is now made until the breathing is regular and of normal depth. Care is taken to see that neither the lower jaw nor the tongue drops back and obstructs respiration. An assistant should hold the patient's hand and elbow gently but firmly, otherwise an involuntary movement may jerk the needle out of the vein.

When the breathing is normal a further 1 c.c. of the solution is injected; a quarter of a minute later another 1 c.c., and so on, until the desired amount has been given; after the injection of each separate 1 c.c. the anaesthetist assures himself that all is well; he will find this method both easier and safer than the continuous method.

Dosage.—Small people naturally require small doses, but, as remarked above, the average adult will take a gramme of hexobarbitone or half a gramme of Pentothal.

As the speed at which these drugs disappear from the blood stream depends upon the metabolic rate of the body, it naturally follows that those with low metabolism such as the aged, the infirm, the hypothyroidal and those who have received premedication not only require smaller doses than the more robust, but also remain "under" for a longer time. In a healthy person the drug is mostly metabolized after about half an hour, but most patients remain drowsy for much longer than this.

Prolonged Anaesthesia.—Various methods, requiring special apparatus, such as the continuous drip or the special syringe, are used by the specialist, but they are rather beyond our present ambition, which is to describe simple and safe methods of anaesthesia.

Should a patient show signs of coming round too early, as evidenced by his beginning to move or make noises, a further dose may be given slowly (about 1 c.c. each half minute); the effect is carefully watched, and injection stopped when a satisfactory depth of anaesthesia is regained. If the needle is left in the vein, it should be plugged with the stylette, the butt fixed to the skin with a small piece of Elastoplast and a wooden splint bandaged to the back of the arm. Before a further injection is made, the stylette is of course removed and blood drawn into the syringe to make certain that the point is still in the vein.

Complications.—As with other anaesthetics, the best safeguards

are a clear airway and a clear knowledge of how "deep" the patient is.

Intravenous anaesthetics paralyse the respiration before the heart, so if the breathing stops for more than half a minute, an injection of Coramine (nikethamide) or lobeline is given and artificial respiration, preferably aided by oxygen, begun at once and continued until the surplus anaesthetic has been metabolized, when spontaneous breathing will begin; this may take several minutes, occasionally about half an hour, and artificial respiration must be persevered with.

Certain patients do not respond to these drugs, but an excessive dose must never be given; another anaesthetic is used.

No patient should be allowed alcohol within 24 hours of having one of these anaesthetics, or temporary mania may be produced; even without alcohol, this should be guarded against, as lives have been lost through it.

Artificial airways are not as a rule tolerated because they are apt to cause cough, and spasm of the glottis.

RELAXATION.—The introduction of curarine (e.g., Tubarine) has made possible the performance of abdominal operations under intravenous anaesthesia: the relaxation produced by this drug being quite remarkable. We have already observed that in the early stages of administration intravenous anaesthetics tend to paralyse the respiration; as curarine, in addition to paralysing the skeletal muscles, tends to paralyse the diaphragm, it must never be given until the respiration has become steady and full. Oxygen and carbon dioxide *must* be handy, also some ampoules of Prostigmin, which is the antidote. Full details for the administration of the drug accompany the ampoules. Myanesin has a similar effect.

RECTAL ANAESTHESIA

These are more in the nature of premedication drugs than actual anaesthetics. *Avertin* (bromethol) requires much care in the giving, and has rather lost popularity; also it is not altogether free from danger, so has been replaced largely by the intravenous anaesthetics. It is, however, recommended for use before a big operation on an educated person; it has neither smell nor taste, leaves no after-effects and induces several hours' unconsciousness.

Rectal paraldehyde is not used as much as it should be; it is cheap, plentiful, perfectly safe in proper doses and very effective when given to children, who then go quietly to sleep and are taken unconscious to the theatre.

The drug is soluble in ten parts of water, so is given as a freshly made 10% solution in normal saline.

The dose is one drachm of paraldehyde per stone of body weight, the maximal dose being an ounce.

METHOD.—The patient has the usual pre-operative enema and the paraldehyde is given not less than half an hour before the operation.

The patient lies on his left side, with the buttocks raised, a well-lubricated catheter is passed four or five inches into the rectum and the solution of the drug given very slowly (5 or 10 minutes) through a funnel; the patient soon begins to feel drowsy and passes into a deep sleep. Ordinary anaesthesia is, of course, also given for the operation, but only a small quantity generally is required.

"The anaesthetist should not watch the operation at all, it is mostly in this way that the patient is neglected. The surgeon should from time to time enquire from the anaesthetist the condition of the patient, and should never quarrel" (Prabhu Dayal).

Rectal ether is rarely used because of the irritation it causes, but a mixture of two parts of ether with one of olive oil may be given rectally with a funnel and tube, the dose of the mixture being one ounce per stone of body weight. At the end of the operation the rectum should be washed out with warm saline solution.

LOCAL ANAESTHESIA

There are three main groups of drugs: Novocain, Stovaine and Nupercaine. Cocaine is used only as a surface anaesthetic. It is too toxic for injection.

(1) Novocain is *para*-aminobenzoyldiethylaminoethanol hydrochloride. Because of the *para*-aminobenzoyl group, it locally neutralizes the effect of sulphonamides in the tissues into which it is injected. Novocain chemically is procaine hydrochloride; this substance is also known as Ethocaine, Kerocain, Neocaine, Planocaine, Scurocaine and Syncaïne.

Novocain is relatively non-toxic and used in strengths from 0.25%, when as much as 750 c.c. can be injected, to 2%, for local operations, when the maximal dose is about 50 c.c. For extensive infiltration 0.5% is satisfactory, the maximal dose being about 400 c.c.

Pantocaine has the same constitution with a butyl group between the *para*-amino and benzoyl groups. It is also called Decicain, Pontocaine, Anethaine, tetracaine, butethanol, and amethocaine. The addition of the butyl group makes it more powerful, but more toxic, the advantage more or less cancelling out the drawback. For injection it is used in a strength of 1:1,000 or even 1:4,000, the maximal dose being 100 and 400 c.c. respectively.

Its great advantage is that in a strength of 1% it is an excellent surface anaesthetic, unlike Novocain. It is particularly useful in eye work because it has no bad effect on the cornea like that of cocaine; as it causes local hyperaemia it is generally used with adrenaline.

(2) Stovaine (amylocaine hydrochloride).

This is used chiefly for spinal anaesthesia. It is generally considered too irritating for local use.

(3) Nupercaine (formerly called Percaine, but name changed because of its similarity to procaine).

This is α -butyloxycinchoninic acid diethylethylenediamide hydrochloride. Because of the absence of the *para*-aminobenzoyl

group it does not antagonize the sulphonamides. Like Pantocaine it is used in very dilute solution, 1:1,000 or 1:1,500 being adequate; the maximal dose is about the same. Its effect lasts longer than that of the other local anaesthetics and it is the drug of choice for spinal anaesthesia.

Alkalis precipitate Nupercaine, so care must be taken that the distilled water is pure and that syringes, etc., are not boiled in alkaline water. Should a precipitate, as shown by cloudiness, appear, a few drops of acid. hydrochloric, dil. will rapidly cause solution.

A few cases of convulsions, one fatal, have been reported after massive infiltration with this drug; the conclusion is drawn that the maximal dose of 1:1,000 solution should be 15 c.c. per stone of body weight, or about 1 c.c. per pound. Treatment is as for ether convulsions.

METHODS

Local Infiltration

The operation area itself is infiltrated with solution. The method has the drawback that it obliterates landmarks; it is also said to devitalize the tissues, but some recent workers say it has the opposite effect—possibly it does neither. As the skin is the most sensitive part, a weal should be raised at the site of incision. As already remarked, for extensive infiltration $\frac{1}{2}\%$ Novocain, or 1:2,000 Pantocaine or Nupercaine is generally used. The syringe and an adequate supply of anaesthetic solution are kept ready during the operation for further injections, if necessary. The addition of a small quantity—the total amount injected should not exceed 2 c.c.—of adrenaline solution intensifies and prolongs the effect of the anaesthetic and minimizes capillary haemorrhage. In the reduction of fractures the injection of 2% Novocain into and around the clot between the fragments is of the very greatest value.

For dental extractions, etc., 2% Novocain with adrenaline is injected with a special syringe into the gum on either side of the tooth. The teeth of the lower jaw can be anaesthetized by injection of the inferior dental nerve where it enters the foramen, located at the centre of the inner surface of the ascending ramus. The landmark is the lingula which guards the foramen and is easily felt a finger's breadth behind the last lower molar tooth. Anaesthetizing the whole upper jaw is a more complicated procedure, for which special works should be consulted. Nerve block is safe in all conditions but the gum surrounding a tooth should not be injected in the presence of acute sepsis, e.g., abscess at the root of a tooth, or osteomyelitis of the jaw may follow.

Isolation

The area of operation is mapped out, and then surrounded by weals of local anaesthetic, which is also injected into the deeper structures; the weals are generally about 4 inches apart. In operations on the fingers or the penis, a ring of anaesthetic is injected round the base; adrenaline should not be used for these cases owing to the remote risk of gangrene.

Nerve Block

The needle does not actually pierce the sheath of a major nerve, but 10–20 c.c. of local anaesthetic are injected round it.

The position of the major nerves will be found in an anatomy book or one devoted to local anaesthesia, but it may be mentioned that the brachial plexus is half-an-inch above the middle of the clavicle at a depth of about one inch, the needle being pointed backwards, downwards and inwards. It is essential to withdraw the plunger before making the injection, to make sure that the needle is not in the subclavian vein or artery. The ulnar nerve is easily injected at the elbow, and the external popliteal (common peroneal), where it winds round the neck of the fibula.

SPINAL ANAESTHESIA

The same drugs are used as for local anaesthesia (*see above*). Novocain (Planocaine, Neocaine) is generally issued as sterile crystals in an ampoule, the solution being made with cerebrospinal fluid; and Nupercaine as a light (1:1,500 solution in normal saline), or a heavy (1:200 solution in 6% of glucose) solution.

For some reason the quite unnecessary and dangerously similar words "hypoharic" and "hyperbaric" have been coined to represent light and heavy; they will not be used here.

Most administrators have a preference for one particular spinal anaesthetic, the writer's being for light Nupercaine in all abdominal cases, and heavy Nupercaine in rectal, vaginal and lower-limb cases. Nupercaine is said to cause less fall of blood-pressure than other spinal drugs.

Novocain does not seem to be so certain in its action, its effect is not so prolonged, and it is a nuisance having to dissolve the crystals in cerebrospinal fluid while the needle is in the patient's back.

The writer has seen several cases of bladder and rectal incontinence following Stovaine, so has given up using it.

ADVANTAGES OF SPINAL ANAESTHESIA.—

- (1) Perfect relaxation.
- (2) Absence of post-anaesthetic vomiting.
- (3) The operator can give a spinal anaesthetic, thereby dispensing with a separate anaesthetist, or, better still, with a bad one. A spinal anaesthetic will often cure paralytic ileus and is the anaesthetic of choice when the bowels are distended or obstructed.
- (4) It causes contraction of the intestines, thus increasing the amount of room in the abdomen.
- (5) No painful sensory impulses reach the brain, so shock is diminished.

DRAWBACKS.—

- (1) The patient remains conscious—but this is easily overcome by premedication.
- (2) Intestinal contractions theoretically increase spread of sepsis in cases of perforated viscus or might even cause a threatened

perforation to become an actual one—largely offset by increased ease of gentle manipulation at operation.

- (3) Drop in blood-pressure dangerous in collapsed or weakly patients or in those with hardened inelastic arteries.
- (4) Nervous sequelae affecting the bladder and rectum occasionally occur, most commonly with strong solutions, and in old men.
- (5) Unsuitable for children.
- (6) Dangerous for anaesthesia above the diaphragm.
- (7) Meningitis has followed spinal anaesthesia; unknown with proper aseptic routine.
- (8) Post-anaesthetic headache fairly common.
- (9) Not always effective.

LUMBAR PUNCTURE.—See Lumbar Puncture.

LIGHT, HEAVY AND MEDIUM SPINAL ANAESTHETICS.

—When it gets into the cerebrospinal fluid a spinal anaesthetic obeys first the laws of gravitation and then those of diffusion and chemical combination.

In other words, the first thing a light solution does is to float to the top, a heavy one to sink to the bottom, and one of medium weight to stay where it is, after which diffusion and combination take place.

It will, therefore, be seen that with a preparation of medium weight the height and site of injection will largely control the height of anaesthesia; but that in the case of the light and heavy preparations gravity is of great importance. Equally obviously, an even more important controlling factor is the amount of drug injected.

As the drug diffuses out into the cerebrospinal fluid its concentration becomes less, being lowest at the "advancing margin"; the result of this is that unless the drug has been administered with murderous intent or criminal negligence it probably cannot reach the medulla in sufficient concentration to cause death. If, however, it is allowed to spread into the high thoracic region it paralyses the intercostal muscles and may cause respiratory embarrassment; this, combined with the fall in blood-pressure, may be sufficient to cause anoxaemia of the vital medullary centres, the treatment of which will be discussed later.

On no account must any spinal anaesthetic reach as high as the fourth cervical segment, because it will then cause paralysis, not only of all the intercostals, but of the phrenic nerves too, and death follows in a few moments.

Diffusion takes about 5–10 minutes, and meanwhile the drug is combining with the nerves it paralyses and thereby becoming fixed; this process takes half an hour with a light anaesthetic and 15 minutes with a heavy or medium one. The patient can then be put in any position.

The importance of this discussion will be realized in a few moments. If you hold a rabbit up by its ears with one hand and pull its hind legs down with the other, it soon faints and will

ultimately die from cerebral anaemia. If a patient's blood-pressure is suddenly depressed by a spinal anaesthetic and his head is raised well above his feet, the same thing is likely to happen; therefore it is necessary to keep the head low. "But you have just been telling me that on no account must the spinal anaesthetic reach the cervical spine, not to mention the medulla", says the reader. The answer lies in the curve of the dorsal vertebrae and the fact that the heart lies in front of the spine. If, therefore, the patient is tilted to a moderate Trendelenburg position with the head propped up so as to flex the neck thoroughly, the cervical spine can be well above the lowest part of the dorsal spine while the head is level with the heart. In the case of a light spinal anaesthetic, of course, the question does not arise; the patient is put into the Trendelenburg position with the head well below the dorsal spine.

METHOD

(a) In all cases

- (1) See that the solution is at body temperature, otherwise its specific gravity will be wrong.
- (2) Take the patient's blood-pressure. If it is below 90 or above 190, choose another anaesthetic or postpone the operation. (The average fall in blood-pressure with a spinal anaesthetic is 15-30 mm. Hg.)
- (3) Before giving the spinal anaesthetic give an intramuscular injection of $\frac{1}{4}$ grain ephedrine hydrochlor. or an ampoule of Methedrine or Phedracin in order to maintain the blood-pressure.
- (4) See that there is some cotton-wool and collodion or Tinct. Benzoin. Co. for putting on the lumbar skin puncture.
- (5) Thoroughly sterilize the patient's lumbar skin, mark the level of the highest point of the iliac crest with a dab of iodine or mercurochrome, and sterilize your own hands, or, better, put on a pair of sterile gloves.

(b) Light Nupercaine

AMOUNT TO BE INJECTED

For perineum only	..	6 c.c.
Below umbilicus	..	10-12 c.c.
Above umbilicus	..	12-15 c.c.

These are for patients of average height; tall patients require 1 or 2 c.c. more, and short people (including most women) 1 or 2 c.c. less. (In a large series of abdominal operations in India the writer gave an average of 13 c.c.)

FOR AN ABDOMINAL CASE

- (1) Inject ephedrine or other vasopressor (see above).
- (2) Tilt the table to 5 degrees, head end low.
- (3) The patient lies on his side with the affected side uppermost; make the lumbar puncture between L3 and L4.
- (4) Slowly inject the required amount of anaesthetic, slightly withdrawing the plunger once or twice to confirm that the needle remains in the canal.

- (5) Keeping the patient's head low, turn him on his face. The convexity of the dorsal spine should be the highest part (see Fig. 2).

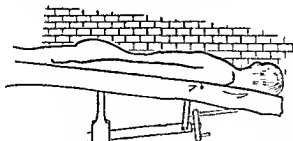


Fig. 2.—Position of patient for light spinal anaesthesia

- (6) Leave him thus for six minutes.
 (7) Turn him on his back, still keeping the head low.
 (8) By the time the towels, etc., are arranged the patient is generally ready for operation, but it is often necessary to wait for 10 minutes before anaesthesia is complete.
 (9) The head must be kept low for 30 minutes after the injection, by which time the anaesthetic is "fixed" and the patient can be put in any position without danger.

FOR A PERINEAL CASE

Proceed as above, but inject only 6 c.c. of Nupercaine, and instead of tilting the table to 5 degrees put it in almost the full Trendelenburg position and keep it so for 10 minutes. Begin the operation about 15 minutes after the injection, with the head only slightly lowered, and the patient in the lithotomy position.

(c) Heavy Nupercaine or Anethaine

This solution (1:200) is $7\frac{1}{2}$ times more concentrated than light Nupercaine, so the volume injected is proportionately less. It takes about 5 minutes to act and 10–15 minutes to "fix", after which the patient can be put in any position. Dosage is as follows:

For perineum only ..	1 c.c. (patient sitting up).
Below umbilicus ..	1.8 c.c. (injected slowly).
Above umbilicus ..	2.0 c.c. (see below for special method of injection).

FOR A UNILATERAL OPERATION

For a unilateral operation, such as that for hernia or on one of the legs, the patient first lies with the affected side downwards; the head and shoulders are slightly raised and the table is in 5 degrees Trendelenburg position; the dorso-lumbar region of the affected side is thus the lowest; after 5 minutes the patient is put on his back.

ABDOMINAL OPERATIONS

The patient lies on his back, the table being slightly tilted (3 to 5 degrees) with the shoulders at the lower end but the head raised. For operations *below the umbilicus*, the thighs are flexed on the abdomen so as to form a dorsi-lumbar pool in which the anaesthetic remains. Movement and sensation in the legs are not necessarily abolished.

For operations *above the umbilicus* the position of the patient is similar, but the table is tilted more steeply so that the mid-dorsal region is the lowest point, the head, of course, being raised as before. The method of injection is also slightly different; $\frac{1}{2}$ c.c. of cerebrospinal fluid is drawn into the syringe before any injection is made; half the contents of the syringe is now injected; another $\frac{1}{2}$ c.c. of cerebrospinal fluid is then withdrawn and the whole of the resulting mixture slowly injected. In no circumstances must the head or neck be the lowest part until 15 minutes after the injection, otherwise there is danger of phrenic nerve paralysis.

(d) Medium weight spinal anaesthetics

Of the Novocain series, those generally used are Neocaine (French) and Planocaine (English), the dose varying from 80 to 150 mg. according to the height of anaesthesia required. They are supplied as crystals in sterile glass ampoules, different colours being used for different doses

DOSAGE AND SITE OF PUNCTURE

For perineum and lower limbs

Neocaine 80 mg. or Planocaine 100 mg. injected between the 4th and 5th lumbar vertebrae.

Below umbilicus

Neocaine 100 mg. or Planocaine 150 mg. injected between the 2nd and 3rd or 3rd and 4th lumbar vertebrae.

Above umbilicus

Neocaine 120 mg. or Planocaine 150 mg. between 1st and 2nd lumbar or 12th dorsal and 1st lumbar vertebrae. With a high puncture the stylette should be withdrawn *before* the canal is entered and the point cautiously advanced until cerebrospinal fluid comes out; this prevents damaging the cord or nerves.

METHOD

- (1) Inject ephedrine or other vasopressor.
- (2) Sterilize the outside of the ampoule with 10% Dettol in spirit, or it may be previously boiled.
- (3) Open the ampoule.
- (4) Do the lumbar puncture.
- (5) After a few drops of fluid have escaped, attach the 5 c.c. syringe to the needle and withdraw 3 c.c.; the fluid must be withdrawn slowly or a membrane may block the point of the needle.
- (6) Detach the syringe and reinsert the stylette so as to stop the flow of cerebrospinal fluid.

- (7) Attach a fairly wide needle to the syringe and squirt the withdrawn fluid into the ampoule; mix it well with the crystals until they dissolve, which they do very soon.
- (8) Slowly inject about a third of the fluid, withdraw 1 c.c. of cerebrospinal fluid and inject the mixture, repeating this after the injection of each 1 c.c.
- (9) Put the patient on his back, lower the shoulder-end of the table 5-10 degrees and raise the patient's head. A similar technique is used for Isotonic Buffered Nupercaine which is in 1:200 solution; a 10 c.c. syringe is required because the solution has to be diluted with 4 times its volume of cerebrospinal fluid, making the strength 1:1,000. The dose is 1.4 to 2.0 c.c. of the undiluted solution, which is drawn into the syringe before the puncture is made. For operations below the umbilicus the table is tilted to 10-15 degrees and for above the umbilicus to 20-25 degrees.

COMPLICATIONS.—Owing to the larger area affected and the greater proximity of vital nerve centres, complications are commoner in high anaesthesia than in low. The best preventive is the Trendelenburg position, which is essential for light spinal anaesthetics and is perfectly safe 15 minutes after the injection of a heavy one.

Faintness.—The chief reason for this is that the fall in blood-pressure diminishes the venous return to the heart. It is therefore treated by lowering the head-end of the table still further, and by an injection of ephedrine or similar drug; if the operation permits, sips of cold water may be given and smelling salts are also useful.

Vomiting.—This is fairly frequent especially if the peritoneum is dragged upon. It is distressing to the patient and annoying to the surgeon, particularly if there is violent retching, but otherwise causes no harm; the patient often goes to sleep afterwards. Treatment is to stop the operation until the attack is over, generally a matter of a few minutes.

Respiratory failure.—If the patient shows any signs of cyanosis, treatment should be immediate and threefold: see that the airway is clear, give oxygen, give carbon dioxide. Artificial respiration may be required. As already remarked, the condition is due to anoxaemia of the vital centres, not to direct poisoning of them by the drug.

Sequelae.—The commonest immediate sequel is headache: this is probably due to leakage of cerebrospinal fluid and is guarded against by the use of a fine lumbar puncture needle and by inserting it with the bevel facing the patient's side so that the point slides between the longitudinal fibres of the dura mater instead of cutting across them; a further precaution is to keep the head of the patient's bed low for 24 hours after operation.

Difficulty in micturition, which is commoner in men, is not necessarily due to the spinal anaesthetic; it is often met with after operations under an inhalation anaesthetic. Now, the nerve which

empties the bladder, by relaxing the sphincter and stimulating the detrusor, comes from the 2nd and 3rd sacral segments. The cutaneous nerves of the buttocks and round the anus come from the 3rd, 4th and 5th sacral segments. If, therefore, the difficulty in micturition is due to the drug, there will be some cutaneous anaesthesia in these areas.

The desire to defaecate arises when faeces enter the ano-rectal canal, which is normally empty. Both the sensation of the canal and the contractile power of the colon are controlled from the sacral nerves, so if these are paralysed the patient is by no means grateful to his anaesthetist; he neither knows when he should defaecate nor would he be able to do so if he did know.

Happily, these misfortunes are both rare and temporary, ultimate recovery being almost invariable.

They are best avoided by injecting a concentrated spinal anaesthetic very, very slowly and using a dilute one when possible; as already remarked, in the writer's experience, such complications are commoner after Stovaine than after any other spinal anaesthetic.

Treatment is to empty the bladder by catheter and the colon by enema; vitamin B₁ (thiamine hydrochloride) in doses of 6-12 mg. daily, may also be given; when fit to do so, the patient may be encouraged to micturate in a hot bath. Considerable improvement takes place after a few days, although months may elapse before complete recovery. Cleanliness and the sulphonamides are the best protection against cystitis.

Pain in the back often occurs during the first few hours or days after a lumbar puncture. This is best avoided by using a fine needle as already advised, and by not hitting the far side of the spinal canal with the point of the needle; this has occasionally damaged an intervertebral disc with resulting herniation of the nucleus pulposus.

ANAPHYLAXIS (*See also Allergy and Specific Therapy.*)

As a result of experiments upon animals, particularly guinea-pigs, the danger of this awkward phenomenon has probably been exaggerated, and it is now considered that the risk of anaphylaxis does not justify the withholding of subcutaneous or intramuscular injections of serum, although intravenous injections must be given with more caution.

SUSCEPTIBLES.—The following should be treated with suspicion. asthmatics, patients who are liable to urticaria, and patients who have had injections of serum more than ten days previously. If, however, the previous inoculation caused no reaction it is unlikely that this one will, so it is safe to go ahead; but if there was a reaction, this one is likely to be worse. Anaphylaxis is due to the introduction of a foreign protein, not of an immunizing substance; for instance, if a patient has previously been treated with anti-diphtheritic serum prepared from a horse he is liable to have a reaction when given anti-tetanic serum prepared from an animal of the same species. Modern refined and concentrated ser-

are much less likely to produce a reaction than the cruder productions of an out-of-date factory, and should always be used whenever possible. Symptoms consist of the sudden collapse of the patient, which must not be confused with the faintness that afflicts some people when having a hypodermic injection. The patient becomes cold and cyanosed and the pulse may be imperceptible; with an intravenous injection the symptoms come on immediately, but with an intramuscular injection two or three hours may elapse.

TREATMENT.—This is the prompt injection of one or two c.c. of adrenaline solution, 1:1,000; this may be followed by the intravenous injection of 10 c.c. calcium gluconate. Warmth, brandy and Coramine are also given.

SERUM RASHES AND SERUM SICKNESS.—These come on about ten days after an inoculation and can be very troublesome.

The best treatment is the intramuscular injection of adrenaline in oil; as the effect lasts for about 8 hours it should be injected 3 times a day. Intravenous calcium has a transient beneficial effect but is worth trying. Calcium may also be given intramuscularly. A saline purge, preceded or not by calomel, is usually given.

To allay irritation, calamine lotion is about the best, and 10 grains of chloretone or 3 grains of Luminal (Gardenal) will often arrest the vomiting, and hyoscine (gr. $\frac{1}{100}$) may be given.

PREVENTION.—If a large amount of serum is to be given and a patient seems likely to be an anaphylactic subject he should not be given serum intravenously until he has been tested and if need be immunized. To test a patient, inject a few minims of the serum intradermally; if a weal occurs within half an hour, add 1 c.c. of adrenaline to the serum it is proposed to inject, and at intervals of 5 minutes give increasing doses intramuscularly, starting with $\frac{1}{2}$ c.c. and working up to 5 c.c. If all is well at the end of half an hour, give the rest of the serum slowly.

PYROGENS.—This seems to be a fitting place for discussing these annoying bodies, which are responsible for rigors and fevers after a watery intravenous injection. They appear to be bacterial products which form in water distilled into non-sterile containers, and while boiling destroys the bacteria it does not destroy the pyrogens.

Pyrogen-free water can be prepared by distilling water to which a little permanganate of potash and sulphuric acid—enough to produce a pale pink colour—have been added, the distillate being collected in a closed sterile vessel which has been washed out with potassium bichromate solution, followed by pyrogen-free distilled water.

Pyrogens can also be removed by animal charcoal.

Sterile pyrogen-free water can be bought in ampoules and flasks.

ANEURYSM

The terrible pain of aneurysm is more rapidly and lastingly relieved by potassium iodide than by any other drug.

The dose should be 20 gr. gradually increased to 30 gr. t.d.s. Fortunately, patients suffering from this condition generally show a remarkable tolerance to large doses.

Amyl nitrite is also of service, and venesection in extreme cases generally gives marked relief.

The treatment of aneurysm in the limbs has been carried out by pressure either directly over the sac or the supplying vessel. There are many objections to pressure treatment; it is very painful, prolonged, uncertain, liable to relapse, and not free from danger.

Excision of the sac has been extensively practised, but Matas' operation, by which the aneurysm is obliterated by a series of tier sutures, is undoubtedly the best operation.

ANGINA OF LUDWIG

This dangerous disease requires prompt and sometimes drastic treatment. The first thing to do is to give an injection of 50,000 units of penicillin, which is followed 3-hourly by 20,000 units. If surgical treatment is required it is carried out as follows.

Unless the medical attendant is an experienced surgeon he should open the abscess by Hilton's method, making a small transverse incision an inch behind the symphysis menti and then thrusting in a pair of sinus forceps until he strikes pus, which is then drained in the usual manner.

Hamilton Bailey makes a transverse incision, longer on the affected side, 1 inch behind the symphysis menti, and then cuts through the platysma and anterior belly of the digastric. The submaxillary gland now comes into view, partly deep and partly superficial to the digastric muscle, and with the facial artery lying in a groove on its upper border. The artery is isolated by blunt dissection and tied, the mylohyoid muscle is divided, the abscess, if present, opened, and the wound packed with sulphonamide-Vaseline gauze.

Sulphathiazole may also be given by the mouth.

ANGINA PECTORIS—*See* Heart.

ANGIOMA

Of the several forms, spider naevus is usually cured in two sittings by electrolysis. Port-wine stains are not frequently improved by treatment; X-rays and radium have been tried. Cavernous naevi should be treated with the radium plaque or CO₂. The large naevi common on the scalp of infants are successfully treated by CO₂ snow.

ANOREXIA NERVOSA (*See also* Hysteria.)

As pointed out by Ross, this condition, although fortunately not common, is of importance because it is the one form of hysteria that directly threatens life. The patient is generally a woman, often young, and either not married or unhappily married.

The chief danger in treatment is that the disease may not be

suspected but may be thought to be some other wasting complaint such as tuberculosis or malignant disease. Treatment is preferably carried out in an institution and is by psychotherapy; considerable success has been reported from the barbiturate treatment described under Hysteria.

ANTHRAX

MALIGNANT PUSTULE.—Three or four days after infection a boil-like papule arises, which soon becomes haemorrhagic and surrounded by small papules. A bacteriological examination shows the typical, large, rod-like anthrax bacilli.

TREATMENT.—Penicillin, 200,000 units intramuscularly each 24 hours in equal 3-hourly doses, renders both the smear and the culture negative in 48 hours, but the treatment should be given for 4 to 5 days to ensure a cure. This is the treatment of choice.

The older treatment with Selavo's serum and N.A.B. is also effective, but less so than penicillin. An average dose is 200 c.c. of serum intravenously, with 0.3 to 0.45 gramme N.A.B. or similar preparation, dissolved in water, added. The serum is given daily, the N.A.B. every other day, and the treatment generally lasts for 5 days. Anaphylactic symptoms are combated by adrenaline, brandy and warmth.

ANUS (See also Haemorrhoids; Rectum.)

WARTS OR PAPILLOMATA.—Contrary to general belief these are not as a rule gonorrhoeal. They are smaller, rougher and more numerous than condylomata. When in doubt, look for other syphilitic lesions, have a blood test done and scrape for spirochaetes if there is a dark-ground microscope. Incidentally, condylomata are highly infective, so do not touch them.

The simplest treatment of uncomplicated warts is to cauterize them with the silver nitrate stick. If this fails, they may be cut off with a pair of scissors under local anaesthesia, the incisions radiating from the anus. The wounds are cauterized as soon as made and the area dressed with Cihazol or similar powder.

ANAL FISSURE.—Recent small fissures can often be cured by cauterizing twice a week with silver nitrate or sometimes by the application of an anaesthetic ointment, such as Nupercainal, combined with daily stretching of the sphincter, for which the largest size Hegar's dilator does very well.

More severe cases should be treated by injection into the sphincter of 5–10 c.c. Proctocaine. This relieves spasm. The fissure is then cauterized with silver nitrate twice a week, or with pure Ichthyol every other day. Thorough stretching of the sphincter with the thumbs, under spinal or general anaesthesia, often has a very good effect.

A *chronic Fissure* must not only be excised, it must be drained; a triangular flap of skin, with its point at the fissure and its base an inch away, and half-an-inch wide, is excised together with the

fissure; the sphincter is then thoroughly stretched and the wound dressed with 5% sulphonamide-Vaseline gauze. Daily dressings are required to prevent premature closing of the skin wound.

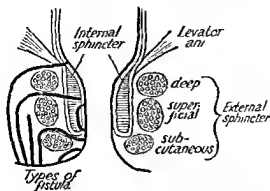


Fig 3.—The anal sphincters (after Morgan)

FISTULA

BRIEF NOTE ON ANATOMY.—The internal sphincter ani is a thickened continuation of the muscular coat of the gut. The external sphincter consists of three parts—deep, superficial and subcutaneous.

Multiple fistulae generally—but not always—communicate.

Posterior fistulae open internally in the middle line, anterior at the nearest point. Not only must the whole track be laid open, but the incision must be carried half-an-inch beyond the skin end of the fistula and a one-inch cut made at right angles; the skin flaps are then cut away and the triangular wound packed.

Most fistulae are of the low type, that is, they open internally between the subcutaneous and superficial portions of the external sphincter, so they can be completely opened up with impunity, because only the subcutaneous sphincter is divided. The high fistula opens internally above the superficial or the deep external sphincter. These muscles must not be divided at the first operation or incontinence may follow. A loose ligature is put round for identification purposes and the sphincter is divided, if necessary, a fortnight later, when scar tissue has formed which will prevent wide separation of the divided ends. About 15% of fistulae are tuberculous. This is suspected if the granulations are pale and unhealthy looking. The granulations can be macerated with normal saline and stained like a sputum slide, or they may be injected into a guinea-pig.

IMPERFORATE ANUS.—If there is a dimple which bulges when the child cries, incise it and let out the meconium. If the dimple does not bulge, insert a wide hypodermic needle to a depth of not more than half-an-inch; if meconium can be drawn out with a syringe, incision is safe, but if not, a left inguinal colostomy must be done. Surprisingly enough, these children often thrive.

PRURITIS ANI.—In children the cause is nearly always threadworms, which occasionally occur in the adult. (*See Worms—Threadworms*, for treatment.)

In order to effect a cure of pruritis the cause must be found, so a careful examination should be made.

Common causes are:

- (a) Piles, past or present.
- (b) Faulty anal toilet, e.g., with a newspaper, a stone or even nothing.
- (c) Moisture of the skin, generally because mucus is leaking from the anus.
- (d) Ringworm (epidermophyton, trichophyton).
- (e) No ascertainable cause except middle age and a sedentary life. Many theories, ranging from venous stasis to lack of vitamin A.

TREATMENT.—If the cause is found, treat it.

General.—Attend to constipation, chronic dysentery, or mucous colitis if present. Prescribe reasonable exercise and vitamin A. If, as often happens, the patient is of a nervous type, 10 grains of bromide t.d.s. and a grain of Luminal or Gardenal at night may help.

Local Treatment.—In the absence of an obvious cause, in order of severity of the lesion:

- (a) The patient uses something soft for wiping himself, or uses a "lota" and carefully dries the skin afterwards.
- (b) The skin is kept dry and powdered with zinc and borie powder.
- (c) Even if there are no obvious piles, an injection of carbolic acid in almond oil (for method, *see Haemorrhoids*) often helps by relieving congestion.
- (d) A local anaesthetic ointment, e.g., Nupercainal or Chloretone and adrenaline is often most effective.
- (e) If the above measures fail, superficial X-ray therapy is often a dramatic success and is always worth trying. The treatment must be given by an expert and sometimes fairly heavy dosage is needed.
- (f) Subcutaneous injection of 10 c.c. of Proctocaine under and beyond the affected area.
- (g) If all else fails, the sensory branches of the perineal and inferior haemorrhoidal nerves are cut. The sensory nerves are identified at operation by the fact that electric stimulation does not cause muscles to twitch. If the main nerve trunks are divided there will be paralysis of the sphincter—not a good thing.
- (h) An alternative but less effective method is to dissect up the itching skin subcutaneously and widely, and to swab its under surface with alcohol on a small swab held in a forceps inserted through the small incision. Local anaesthesia is adequate.

SOME APHORISMS

GENERAL.—When you don't know what is the matter with a patient, look wise and tell him to send a specimen of urine in the morning (MacGregor).

The two causes of morning sickness are pregnancy and alcohol (Rutherford Morison).

Clean living, a good digestion and a clean mouth are seldom found with bad breath.

Every religion teaches that the poor should have the same care as the rich.

The commonest things most commonly occur (Johnston).

Do not get angry with your staff, your patients, or even your patient's relatives.

A doctor's personality is as important as his ability.

Do not let laboratory examinations be an excuse for clinical laziness.

MEDICAL.—Make haste to order the latest remedy, before it loses its power to cure (Trousseau, 1848).

Many cases of "heat stroke" are cerebral malaria.

In obscure cases intravenous quinine does no harm and may save life.

Much illness and many lives could be saved by a timely examination of the sputum.

Post-tussive crepitations are a common sign of early tubercle.

There is no such disease as spermatorrhoea (Rutherford Morison).

Insomnia never seems so severe to the nurse as it does to the patient.

SURGICAL.—Better a laparotomy than a *post-mortem* (Beattie).

The good God knows more about the human body than even the youngest surgeon.

Never do a prostatectomy on a patient with a brown, dry tongue; he will die of uræmia (G. N. Sen).

An old man with recent piles has an enlarged prostate, or rectal cancer.

It is unwise to undertake a dangerous operation until your reputation is established.

An operator should have both eyes on the patient, not one on the spectators and the other on the clock.

When you suspect a fracture, treat it (Fortune).

Abdominal tenderness is not a sign of intestinal obstruction.

WOMEN.—Half women's diseases are due to having babies, the other half to not having them.

Never tell a woman she must never have a baby.

About a quarter of the women in this world have a retroverted uterus.

Ninety-seven per cent of children could be born without a doctor.

The commonest lump in a woman's abdomen is a baby, in a man's, tubercle.

Always listen to an ovarian tumour; if it is silent, pass a catheter. "Threatened abortion" with abdominal tenderness and unilateral pain is ectopic gestation.

When examining a young woman, always have another person in the room.

A good obstetrician can deal with any emergency; a better obstetrician has no emergencies to deal with.

When a woman has a lump in one breast, always examine the other.

CHILDREN.—Children are constructed to live.

In a baby, constipation means starvation.

A baby will often have a convulsion when an adult would have a rigor.

In a child with indigestion, think of appendicitis first, acidosis second, and indigestion third.

NERVES.—To find out if a patient is neurotic ask about "the nerves". Patients with "bad nerves" are just as proud of them as those with "good nerves" (Adie).

Tabs and G.P.I. are rare in India.

If the optic discs, the knee-jerks and the plantar reflexes are normal, the patient is not suffering from a major disease of the central nervous system (Adie).

MISCELLANEOUS.—A puzzling skin condition may be associated with unsuspected amoebiasis (Prebban Dyal).

In old people, inability to see near objects means presbyopia, distant objects, cataract (Henry Smith).

When blindness is due to cataract the patient looks at the ground; when it is due to glaucoma he stares straight ahead (Holland).

When called to an accident or criminal case, always make careful notes at the time, and keep them carefully.

APOPLEXY—See Nervous System (Hemiplegia).

APPENDICITIS

ACUTE

Immediate operation is indicated:

IN CHILDREN—always.

IN ADULTS—

(a) When the case is seen within 48 hours of onset of symptoms.

(b) When there is marked tenderness over McBurney's point.

(c) When there is rigidity.

(d) When the pulse rate is rising.

(e) When the patient looks flushed or toxic.

Ochsner-Sherren treatment (see below) is permissible:

(a) When the case is seen more than 48 hours after onset and symptoms are not getting worse.

(b) When there is a lump. This indicates that the omentum has taken charge and that the inflammation is being localized.

There is often pus in the middle of the lump, but this can absorb.

- (c) When the patient has survived previous but severer attacks.
- (d) When there is real doubt about the diagnosis, but remember, "Better a laparotomy than a *post-mortem*".
- (e) When there are no facilities for an operation.

OCHSNER-SHERREN (DELAYED) TREATMENT.—

- (a) The patient is prepared for operation.
- (b) The patient is put in the Fowler position, that is, sitting up in bed.
- (c) Give nothing by the mouth except cold water.
- (d) Give 2 tablets 4-hourly of the sulphonamide which produces least nausea, e.g., sulphadiazine. In addition, give at least 2 full doses intravenously of a soluble sulphonamide, the second dose 2 hours after the first.
(Penicillin has no action on *Bacillus coli*, but should be given to combat pyogenic cocci.)
- (e) Have the pulse and temperature taken 2-hourly.
- (f) Do not give morphia or a purgative.
- (g) After 72 hours, if things are settling down, glucose can be given by the mouth; 24 hours later, milk or soup will be allowed.
- (h) After 96 hours a glycerin or olive oil enema or a suppository may be administered if required.
- (i) Remove the appendix 6 or 8 weeks later.

INDICATIONS FOR OPERATION DURING OCHSNER-SHERREN TREATMENT.—

- (a) A rising pulse.
- (b) Pain after the first 8 hours.
- (c) Vomiting.
- (d) Any sudden pain or change for the worse.

CHRONIC (RECURRENT) APPENDICITIS

The appendix may cause a chronic dyspepsia, and can be suspected as being the criminal if there is tenderness over McBurney's point. Definite diagnosis is made by a laparotomy or from a skiagram, the latter being pleasanter for the patient. Galstaun gives the following X-ray characteristics of the diseased appendix:

- (a) Fixation.
- (b) "Indian Club", bulbous tip, especially if tender.
- (c) Filiform appendix.
- (d) Marked irregularity of lumen, if persistent and not due to peristalsis.
- (e) Non-filling before 7 hours, with proper technique.
- (f) Delay in emptying after caecum is empty.

DIFFERENTIAL DIAGNOSIS —

ACUTE APPENDICITIS—If the temperature is 103° F. or over, the cause is probably not appendicitis.

IN CHILDREN.—Acidosis (ketosis), pyelitis, intussusception, roundworms in the caecum, food poisoning and haematogenous (usually pneumococcal) peritonitis have to be remembered. Some of the following may also occur in children.

IN ADULTS.—Diaphragmatic pneumonia, pyelitis, renal or ureteric calculus, cholecystitis, ectopic gestation, intestinal obstruction, strangulated hernia, perforated peptic ulcer, ruptured spleen or liver, acute pancreatitis, mesenteric thrombosis, regional ileitis, malaria, epididymitis, indigestion, intestinal influenza, tabes dorsalis and malingering are most of the diseases that can simulate acute appendicitis.

CHRONIC APPENDICITIS.—In India, before this diagnosis is made, and certainly before the patient is submitted to operation, *chronic amoebic dysentery must be excluded* by means of stool examination and skiagrams. Galstaun reports cases in which "I found the liver distinctly enlarged, there was marked diminution in the movement of the right side of the diaphragm with partial obliteration of the right costo-phrenic sulcus. The opaque meal showed some spasticity of the colon. Although the patient's stools were negative, I suggested amoebiasis as the cause of this trouble. All signs and symptoms cleared up under emetine, and there is no doubt the skiagram saved the patient from an unnecessary laparotomy".

APPENDIX ABSCESS.—If this is definitely pointing it should be opened and drained, the appendix, if not destroyed by suppuration, being removed about two months later. A normally placed appendix points anteriorly, a retrocaecal appendix often points in the loin and a pelvic appendix into the rectum.

ARTERIOSCLEROSIS AND HIGH BLOOD-PRESSURE

As this term raises confusion in the minds of many, the different varieties will be quickly described.

ATHEROMA.—This is a degeneration and thickening of the intima; it is due to heredity, age and stress and has nothing to do with syphilis. It may or may not be associated with high blood-pressure; it affects the aorta and other great vessels, also certain small arteries of singular importance, namely, those of the brain and heart. (See Hemiplegia; Heart Disease.) In short, it is a disease of those arteries, large and small, on which our life depends.

DIFFUSE HYPERPLASTIC SCLEROSIS.—This is a widespread thickening of the intima of the arterioles, including those of the kidney; it is accompanied by a thickening of the middle (muscular) coat of the medium-sized arteries such as the radial, which hypertrophy so as to cope with the raised blood-pressure. The heart also enlarges, sometimes very greatly. It occurs in essential hypertension, lead poisoning, gout and kidney disease. Syphilis is not a factor, and the disease often begins at about the age of 35 years.

MONCKEBERG'S MEDIAL SCLEROSIS (SENILE ARTERIOSCLEROSIS, "PIPE-STEM ARTERIES").—This is a senile degeneration of the middle coat of the medium-sized arteries. The degeneration is at first fatty, but this is soon followed by calcification. It is not usually associated with raised blood-pressure but atheroma may coexist. Syphilis is not a factor. It is often visible in skiagrams and may cause senile gangrene.

SYPHILITIC ARTERITIS.—Syphilis attacks the elastic (middle) coat of the aorta, often causing aortic regurgitation; it also attacks the small arteries of the brain, ultimately causing narrowing, thrombosis or rupture, it may attack large areas or small, causing any kind of symptom from madness to monoplegia.

THROMBO-ANGITIS OBLITERANS.—This is not uncommon in India and China and, in the absence of diabetes, syphilis, Raynaud's disease, frostbite or other injury, must be thought of in cases of gangrene or even severe cramps of the foot.

The great point of interest is that the disease is over by the time it causes symptoms, which are due to fibrous contraction of the previously inflamed vessels. In its active phase it is a subacute inflammation of both arteries and veins, especially in the legs, a second point of interest being that if clotting occurs in an inflamed vessel it often becomes canalized afterwards.

It used to be thought that the disease was mainly confined to cigarette-smoking Polish or Russian Jews, but this is not so, although it perhaps has its greatest frequency among them. It is almost entirely confined to men, usually young. Diagnosis is made by a consideration of the history, symptoms and signs, exclusion of other factors, and the absence of pulsation in the posterior tibial and dorsalis pedis arteries.

Treatment is amputation of gangrenous limbs, or lumbar sympathectomy in the pre-gangrenous phase.

HIGH BLOOD-PRESSURE.—The average blood-pressure in a young man is 120–125 systolic, 80–85 diastolic. High blood-pressure is said to exist when the readings are persistently above 150 systolic—90 diastolic before the age of 50 years, or above 160–100 after that age. If the blood-pressure is persistently over 220–120 at any age the condition is serious. Very old men seldom have a very high blood-pressure or they would not be very old men. In a healthy person the blood-pressure varies considerably, and too much reliance must not be placed on a single observation, especially with a nervous patient, but the diastolic pressure is much steadier than the systolic.

When not due to renal disease (see Nephritis), eclampsia, diabetes, pituitary or adrenal tumour, high blood-pressure is called essential hypertension or hyperpiesia. (See above, Diffuse hyperplastic sclerosis.) There are two kinds, benign and malignant; fortunately the former is much the commoner.

MALIGNANT HYPERTENSION.—This generally attacks

middle-aged men, who lose weight and become thin and pale; the disease is diagnosed by its rapid onset, the very high blood-pressure, often above 250 systolic (the writer has seen one of 360 in a Bliora Mahommedan of impeccable virtue but great riches) and, most important diagnostic sign, the presence of optic neuritis with papilloedema and engorgement of the vessels. The urine must be tested macroscopically and microscopically because renal disease produces a similar rise in blood-pressure and a similar picture in the fundus oculi; in fact, it may be impossible to distinguish one from the other, not that it matters much, both soon become of more interest to the pathologist than to the physician.

BENIGN HYPERTENSION.—The earliest symptoms are a feeling of fullness in the head, attacks of vertigo, thoracic discomfort and sometimes impairment of memory, especially for names and recent events.

The aetiology is not certain, and many theories have been propounded, mostly renal. There seems to be some association with pyelitis, and there is certainly a hereditary factor. It most commonly affects thickset, middle-aged, hardworking, prosperous men; it also affects women at the menopause. Syphilis, alcohol, tobacco and septic foci have been accused, but not condemned, as causes, but if any of these factors are present they should receive attention. Lack of exercise, excessive eating, especially of rich protein food, and self-indulgence generally are undoubted factors, as also, on the other hand, are worry and anxiety.

TREATMENT.—This is summed up in the old physician's advice, "Trust in God and keep your bowels open".

The patient's activities should be mildly curtailed, but he should not as a rule be prescribed complete rest, because nothing kills an active man more quickly than boredom. Regular hours, regular exercise and light food are essential. Septic foci demand careful attention, and should be removed whenever possible. The writer has often seen lasting benefit follow extraction of infected teeth.

In spite of many advertised claims to the contrary, there is no specific for the disease; a mild barbiturate (e.g., Luminal gr. 1½) at night, to ensure good sleep, and a mild saline laxative in the morning are efficient. A tablet of *Theogardenal* 3 times a day, later reduced to twice a day, is useful for combating symptoms, and may be taken for long periods. For a temporary rise in pressure, 1 Tabella Glycerylis Trinitratis B.P. 3 times a day is very helpful, as is a daily injection of acetylcholine (a 1 c.c. ampoule usually contains about 2 grains). For severe symptoms, venesection, ½ to 1 pint of blood being allowed to escape, is necessary.

The higher hill stations, especially those with steep climbs from house-to-house, are not recommended, but those between 4,000 and 6,000 feet above the sea are quite safe. Spas owe much of their success to the rigid discipline and simple life they enforce. Women at the menopause benefit greatly from hormone therapy. (*See Gynaecology (The Climacteric).*)

DIET.—In general, the rich foods should be forbidden, such as game, heavy meat, pastries, curries, hot spices, much ghi, red wines. The amount of salt taken, except in hot weather, should be drastically curtailed. Smoking in moderation will do no harm (i.e., up to 12 cigarettes a day).

The following prescription is useful:

R Pot. Acetat.	..	..	..	gr. 15
Sod. Bromid.	..	..	..	gr. 10
Caffeine Cit.	..	..	..	gr. 2
Liquor Glyceryl Trinit.	..	..	..	℥ 1½
Aq. Menth. Pip. ad	..	..	..	3ss
Half an ounce t.i.d. ex. aq. p.c.				

ON TAKING THE BLOOD-PRESSURE.—It must be remembered that patients undergoing a medical examination are apt to be nervous, which fact raises their blood-pressure; if, therefore, other examinations have to be made, these should be made first, in order to give the patient time to settle down. Another method is to take the blood-pressure at the beginning and again at the end of an examination; the latter is usually the lower reading.

Apart from nervousness and disease, the blood-pressure rises at the menopause and also after food, alcohol, exertion or smoking; it falls after rest or purgation.

If the blood-pressure is found to be raised:

- Examine the state of the arteries in the fundus oculi and in the arms.
- Examine the heart.
- Examine the urine.
- Repeat the examination the following day if no other abnormality is found.

To take the blood-pressure:

- Let the patient rest comfortably on a couch or bed, with the head slightly raised; alternatively he may sit in a comfortable chair, but it is better if he lies down. The arm should be straight.
- Apply the cuff of the instrument gently but firmly to the bare upper arm and connect up the tubing. (If the cuff is applied too loosely, the reading will be inaccurate.)
- Palpate the brachial artery at the inner side of the biceps tendon at the bend of the elbow.
- Apply the bell of the stethoscope to it. (If loud pulsation can be heard before the sphygmomanometer is pumped up at all, think of aortic regurgitation.)
- Quickly pump up the sphygmomanometer to about 180 or 200 mm. Hg and listen.
- If, as generally happens, the pulse cannot be heard, open the valve very slightly so that the mercury descends very slowly or the needle goes back very slowly. (If the pressure is allowed to fall too quickly the readings will be too high.)
- As soon as the pulse is first heard note the reading, which is the systolic pressure.

- (h) Allow air to escape slowly until the note changes and then disappears; the point just before the note disappears is the diastolic pressure.
- (i) Repeat the estimation twice and take the mean of the 3 readings, rejecting any that is greatly different from the others.

Average blood-pressures of healthy adults are as follows:

<i>Age</i>	<i>Systolic Pressure</i>	<i>Diastolic Pressure</i>
20	120	80
25	122	81
30	123	82
35	124	83
40	126	84
45	128	85
50	130	86
55	132	87
60	135	89

but considerable variations are compatible with health.

Below the age of 21 years a systolic pressure above 140 is pathological, and at any age a systolic pressure consistently over 160 or a diastolic over 110 constitutes high blood-pressure. The diastolic is less variable and of greater prognostic importance than the systolic pressure.

A systolic pressure below 110 in an adult constitutes low blood-pressure.

The difference between the systolic and the diastolic pressure is the pulse-pressure, normally this is about 40 mm. Hg.

ARTHRITIS

ACUTE NON-SUPPURATIVE ARTHRITIS

By far the commonest cause is an injury such as sprain—see Joint Injuries—otherwise arthritis affects several joints, usually moving from one to another and including the knees. It is found in certain fevers, rheumatic fever being the chief. It used to be a frequent sequel of gonorrhoea, but since the advent of sulphonamides and penicillin, is rarely seen.

Bacillary dysentery may be followed, generally after about 3 weeks, by a troublesome arthritis which confines the patient to bed for some weeks and reacts but slowly to sulphonamides. Dengue is often accompanied by pain in the joints, but there is no effusion. Tuberculous arthritis is discussed elsewhere.

In Malta fever there may be arthritis with considerable effusion and much pain, fresh joints tending to become affected as others subside. Malta fever should therefore be remembered in such cases. Any kind of blood infection, such as typhoid fever or septicaemia, may be accompanied by acute arthritis.

LOCAL TREATMENT.—This consists of rest, heat and the application of some such preparation as Scott's dressing. Painful tension may be relieved by aseptic aspiration.

ACUTE SUPPURATIVE ARTHRITIS*

Again a common cause is trauma such as a punctured wound, another cause being neighbouring osteomyelitis. The condition also occurs in pyaemia, septicaemia, septic throat infections, pneumonia, meningitis and smallpox.

TREATMENT.—As the staphylococcus, the pneumococcus or the streptococcus is the usual cause, sulphathiazole and penicillin are the remedies of choice. Penicillin is not only given intramuscularly—the joint is aspirated daily and a solution of penicillin, 1,000 units per c.c., is injected into it; rapid cure often results.

The joint should be completely immobilized on a plaster of Paris slab (see under Fractures) and open drainage used only as a last resort. Drainage tubes in a joint mean lifelong stiffness.

Acute arthritis of infants is a manifestation of pyaemia, and is treated as such. It is sometimes mistaken for paralysis and the outlook is grave. Treatment is by penicillin injections.

OSTEOARTHRITIS (HYPERTROPHIC ARTHRITIS, OSTEITIS DEFORMANS)

Primarily this is a degeneration, or rather, an inability to make good ordinary wear and tear of the articular cartilage of the joints. We should therefore expect the large weight-bearing joints to be affected, particularly those which have been injured at some time; further, we should expect the disease to afflict old men, whose powers of repair are naturally less than those of the young. All these things are so, the only contradictory feature being, as so often happens, woman, who is liable to the disease at the time of the menopause; otherwise it affects men only.

As the cartilage wears away, the underlying bone does its best to repair the damage. It therefore becomes hard and polished (eburnated) on the articular surface; this is most praiseworthy and all would be well, or at least not too bad, if only the bone's "therapeutic zeal" stopped here. Unfortunately it does not; all round the joint, hyperostosis occurs, with the formation of spurs of bone which severely limit the mobility of the joint. Further, the newly formed bone is tender, the muscles acting on the joint atrophy and the patient becomes a cripple. The articulating bones do not unite, so the joint remains painful on movement or weight bearing, especially when attempts at full movement cause pressure on the new bone surrounding the joint. The joints chiefly affected are the hips, the knees and the intervertebral, especially in the lumbar region (spondylitis deformans). Occasionally, the terminal phalanges of the fingers and thumbs suffer, the exostoses being called Heberden's nodes.

DIAGNOSIS—This is made by considering the age and sex of the patient, the location of the affected joints and the characteristic stiffness and limitation of movement, which is always worse in the morning, reminding one of the poor old tonga pony limping out of the stable to which he trots back at night. Skiagrams are essential; they show the characteristic peri-articular exostoses, the diminution in joint space and the eburnation of the joint surfaces of the bones.

TREATMENT.—This is unsatisfactory. Septic foci are eliminated and the bowels kept free by means of saline laxatives. Aspirin is useful in diminishing pain and thereby allowing movement, and the patient should not be encouraged to stay in bed too long, or like the tonga pony above-mentioned, he will be all the stiffer when he gets up. Local heat, e.g., diathermy, is soothing. When pain is severe, arthrodesis should be considered, because a fixed joint is painless. A vitallium cap fixed over the head of the femur increases mobility and decreases pain but it is not yet known how long the improvement lasts. Gold therapy is useless.

In menopausal osteoarthritis, hormone therapy is often helpful, and in all cases when the patient's weight is excessive, attempts should be made to reduce it.

RHEUMATOID ARTHRITIS (INFECTIVE ARTHRITIS)

In pathology, incidence and treatment, this disease differs from the last, so the two should never be confused.

It begins as a peri-articular inflammation and spreads from the ligaments to the synovial membrane, which becomes covered with, or even replaced by, red granulation tissue; this then invades and destroys the articular cartilages and even the surfaces of the bone; in due course the granulations are replaced by fibrous tissue, which sticks the ends of the bones together and finally, natural cure by bony ankylosis occurs.

Just as the disease works from without inwards in the joints, so it does in the body, starting in the fingers and toes, later affecting the wrists and ankles and sometimes the elbows, knees, hips and even the jaw. It is always symmetrical, generally begins in the middle joint of the middle and ring fingers of both hands, and affects young or early middle-aged women 4 or 5 times as frequently as men.

The joints are hot, tender and painful and show the typical fusiform swelling; the neighbouring muscles waste quickly and considerably, and the skin acquires a typical atrophic shiny appearance. The patient feels ill and has fever, and the blood sedimentation rate is always increased during the active phases.

The patient often loses weight before the onset of joint symptoms.

TREATMENT.—Very occasionally, brilliant results have followed the elimination of a septic focus, so the teeth, sinuses, tonsils, bowels, urine and cervix or prostate are examined, but no organ, even a tooth, still less all the teeth, should be removed unless definitely incriminated. Autogenous vaccines have proved useful, so may be tried.

Gold treatment is the most satisfactory, but it may be several weeks before improvement sets in. Solganal B Oleosum or Myocrisin are the best preparations and are injected intramuscularly at weekly intervals beginning with 0.01 gm. (10 mg.) and working up to 0.05 gm. The course of 5 injections may be repeated after a couple of months. Blood examinations are necessary during this treatment, to guard against leucopenia or agranulocytosis.

Aspirin is useful, but phenazone (antipyrin) must never be given because it greatly increases the liability to leucopenia under gold treatment.

Local measures can be summed up as heat and rest.

ASCITES

The chief causes are:

- (1) Diseases of the peritoneum, generally tuberculosis.
- (2) Chronic failure of right heart (backward pressure).
- (3) Bright's disease.
- (4) Disease of the liver; in India this is nearly always the result of chronic malaria, the spleen always being enlarged; some cases in children may be splenic anaemia (Banti's disease).
- (5) Malignant disease, generally stomach or ovary.

Ascites is diagnosed by the presence of shifting dullness in the flanks, as distinct from a cyst, which is dull in the middle line.

TREATMENT.—See under headings for treating the cause.

Two c.c. intravenously of a mercurial diuretic (mersalyl, Neptal, Salyrgan) once every 3 days, 2 hours after 30 grains of ammonium chloride in water, will often reduce ascites better than anything else.

TAPPING—This is done under local anaesthesia by means of a trocar and cannula. A rubber tube is attached to the cannula and the trocar "stabbed" through it; when the trocar is removed the fluid escapes through the tube into a bucket. The patient first passes urine, and the puncture is usually made below the umbilicus with the patient sitting up. If he is lying down the left lower quadrant is generally chosen.

ASPHYXIA

Respiration is often arrested by conditions which prevent the access of air to the lungs, such as drowning, foreign bodies, throttling, thuggee, irrespirable gases, general anaesthesia, and electrocution.

TREATMENT.—

1. The cause of the asphyxiation is first removed; in the case of a foreign body, by sweeping the index finger round the pharynx; in drowning, by inverting the patient so as to remove the water from the air-passages.

2. Artificial respiration by:

(a) **SYLVESTER-HOWARD METHOD.**—The patient being on his back, with shoulders and chest raised, the operator, kneeling or standing at the patient's head, seizes the patient's bent arms firmly at the elbows, and carries out the movements of expansion and compression deliberately and evenly, at the rate of 16 to 18 per minute. An assistant at the same time aids compression and expansion, with his hands over the lower ribs.

(b) **SCHAFER METHOD** is especially useful, when the operator is alone. The patient is laid in the prone position, on his abdomen, the face being turned slightly to one side, and a blanket placed under the chest. The operator, kneeling across the patient, causes compression and expansion of the patient's chest, by alternately throwing his weight on to the patient's back, by his hands being spread out on each side of the spine, and then relaxing.

The Sylvester-Howard method is preferable, as the expansion of the chest is greater.

Artificial respiration should be kept up for at least two hours.

3. Slapping the patient's body or face with a towel rung out of ice-cold water.

4. Forcible dilatation of the sphincter ani.

5. Tongue traction. The tip of the tongue is seized with the handkerchief-covered fingers, and the organ is rhythmically and fairly forcibly drawn out, at the rate of 16 times to the minute. This is a valuable adjunct to artificial respiration.

6. Intravenous use of warm saline solution 105° F., with 20 m of 1:1,000 adrenaline chloride solution, added drop by drop to the saline solution, by sticking the needle of the hypodermic syringe into the rubber tubing conveying the saline.

Or the direct injection of adrenaline, with a little saline, into the jugular vein in extreme cases.

7. In cases of syncope, inject 5 m of adrenaline into the heart, or open the abdomen and massage the heart through the diaphragm.

ASTHENOPIA

Headaches or pain in or around the eyes should lead to a careful examination for (1) any error of refraction, (2) insufficiency of the external muscles or (3) organic disease of the media or fundus.

ASTHMA

The exact nature of asthma is unknown; there are two theories—urticaria of the bronchial mucous membrane, and spasm of the bronchial muscle. The exciting factor may be neurosis, irritation of the respiratory tract or nasopharynx, idiosyncrasy to certain articles of food or perverted metabolism, emanations such as from pollen, skin, hair, feathers and chemicals. Heredity is common.

The treatment is divided into:

(a) **DURING AN ATTACK.**—Adrenaline hydrochlor., 2-5 m of a 1:1,000 solution, may act with remarkable effect if given at the beginning of the attack.

Ephedrine by mouth in $\frac{1}{2}$ gr. doses, is closely allied to adrenaline but slower in action. It is particularly useful in preventing nocturnal attacks.

In some patients the attack can be cut short by clearing the alimentary canal with an emetic and an enema. Smoking stramonium cigarettes or burning nitre or the following paper may be of service:

- (d) Relationship to other factors, such as food, constipation, diarrhoea, menstruation, exercise, weather, season, altitude.
- (e) Nature of pain—neuralgic, burning, throbbing, nauseating.
- (f) Exact situation, extent and direction of spread. Is it in the middle or on one side, high up or low down, in the muscles or in front of the backbone? Make the patient locate the pain with his hand or finger.

Examination should be thorough and should include exact location of any tender area, percussion over all bony points, taking of blood-pressure and temperature, examination of the rectum in men and of the pelvis in women, effect of active and passive movement of the spine and limbs, examination of the chest, palpation of the liver, spleen and kidneys and examination of the urine.

A skiagram may throw considerable light upon the condition.

A list of possible causes includes amongst others lumbago, fibrositis, spondylitis, injury to an intervertebral disc, sprain of muscles or ligaments, lateral curvature of the spine, sacro-iliac strain or disease, gout, constipation, septic focus, injury, kidney disease or stone, tuberculous spine, growth or disease of the prostate, rectum or colon, pregnancy, pelvic disorders or displacements (see Gynaecology), herpes zoster, malaria, dengue, sandfly fever, influenza and smallpox.

When all these have been considered, however, there often remains some doubt about the cause and therefore the treatment. In these cases local applications such as Little's Oriental Balm or Viek Vapour Rub, local heat by a mustard plaster or Thermogene wool, radiant heat or diathermy should be applied; aspirin should be given by the mouth, the bowels kept free, and an autogenous vaccine made from any septic focus. If the pain is in the muscles and fairly well localized an injection of 5-10 c.c. of Proctocaine into the painful area may work wonders and is generally worth trying. Another method is to inject 10-20 c.c. of $\frac{1}{2}\%$ Novocain once or twice a week into the painful area. In both these methods, the patient should be warned that pain may be increased for a day or two after the injection.

BALANITIS

In acute cases the prepuce should be slit up and sulphathiazole given orally or penicillin injected intramuscularly. Locally, saline or mag. sulph. fomentations should be applied at first, followed in a few days by a Vaseline or sulphathiazole ointment dressing. When the case is clean the patient should be circumcised. If slitting the foreskin reveals a chancre, antisiphilic treatment is given.

Chronic balanitis is an indication for circumcision.

BALDNESS

Loss of hair occurs after fevers, notably the enteric group, in secondary syphilis, in hypothyroidism and in chronic arsenical poisoning (sometimes seen in India when a patient tries to cure

chronic dysentery by taking a long and unauthorized course of Stovarsol, Carbarsone or one of the other arsenical remedies).

The baldness now under discussion, however, is not one of the above, though they must not be overlooked, but the ordinary baldness that affects the middle-aged.

The number of widely advertised proprietary cures is an index of its incurability, but although nobody can restore hair to an ageing scalp, much can be done to prevent loss.

Many causes co-operate to make the hair fall out, notably heredity, age, climate (a hot, damp one is the worst), general health, scurf, seborrhoea, constant wearing of a hat, glandular and possibly vitamin deficiency and finally, membership of the male sex. Some of these conditions cannot be changed, but others can.

GENERAL HEALTH.—Liver injections and tablets containing ferrous sulphate, grs. 3, good fresh food and plenty of fresh air enjoyed without a hat or pagri form a good start in treatment. Septic foci are also attended to.

SCURF.—The sovereign remedy for this is perchloride of mercury; to begin with a 1:1,000 solution is rubbed into the scalp twice daily, the strength being reduced to 1:5,000 after about a fortnight.

SEBORRHOEA.—Vitamin C in large doses (100–200 mg. a day), if plenty of fresh fruit is not available, should be given. Vitamin A, because of its effect on the skin, should be added.

Sulphur is generally recommended for severe seborrhoea, but because of its unsightly appearance it is difficult to use it habitually on the scalp of a person engaged in his ordinary duties. A good cleansing and stimulating "Scattergun" prescription is as follows:

R Hydrarg. Perchlor.	..	..	..	gr ij
Resorcin.	..	..	..	ʒij
Tinct. Cantharidis	..	..	..	ʒi
Glycerin	..	..	..	ʒii
Ol. Ricini	..	..	..	ʒiv
Ol. Rosmarini	..	..	..	ʒi
Spirit Vini Rect (Industrial)				ʒvi
Aq. ad				ʒx

Resorcin sometimes lightens dark or darkens light hair. Salicylic acid may then be used instead.

GLANDULAR DEFICIENCY.—If there are any signs of hypothyroidism (common in women at the menopause) thyroid gland should be given, and in men the androgens (*see Impotence*) may be useful in small doses.

BARBITURATES—*See Insomnia.*

BASAL METABOLIC RATE

The basal metabolic rate is an index of the metabolic rate of a fasting person at complete rest, and is usually expressed in relationship to the average basal metabolic rate of a person of the same sex and age. Thus a result may be given in the form of a raised or

lowered B.M.R. by saying that the value is $+50\%$ or -20% , it being understood that these are values compared with the average normal values. There is a normal range of approximately $\pm 15\%$ in healthy individuals. Any value much above or below these limits must be considered as pathological. A high value ($+20$ to $+100\%$) is of value in confirming the presence and indicating the degree of hyperthyroidism (thyrotoxicosis), especially in those cases known as "masked hyperthyroidism" where the amount of enlargement of the thyroid gland is slight; the rate is also raised in cases of acute leukaemia and in haemolytic conditions. A low value (-15 to -50%) is met in myxoedema and cretinism, and a value of -10 to -20% is often met in deficiency of the anterior lobe of the pituitary gland with such low values, thyroid should be administered until the value reaches normal limits.

BEDSORES

These occur where skin is subject to pressure over a bony point or area, so they are found over the sacrum and posterior ilium, and the hips, heels and elbows. They are almost inevitable in cases of spinal paralysis, for four reasons: (1) leakage of faeces and urine owing to incontinence, (2) absence of the normal slight movements which constantly transfer pressure from one area to another, (3) cutaneous anaesthesia, and (4) loss of trophic influence of the nerves on the skin.

PREVENTION.—

- (1) Keep the skin clean and dry by means of soap, spirit and powder.
- (2) Prevent pressure on likely places by means of air bed, water bed, air ring, cotton-wool and changes of position.
- (3) Avoid creases in the bedclothes and crumbs in the bed.
- (4) Apply Elastoplast to any area showing the slightest tenderness or redness.
- (5) In cases of spinal paralysis apply Elastoplast to likely areas immediately.

TREATMENT—Clean the sore and surrounding skin with spirit, dry and powder with boric acid containing 10% sulphathiazole, or with Cibazol powder.

Cover the area and 1 inch all round it with a double layer of Elastoplast, which must be neither stretched nor creased. If one piece will not cover it use several in contact with one another.

Leave alone for a week or 10 days.

Under this treatment many sores heal in a fortnight.

BERI-BERI

A deficiency disease due to lack of vitamin B₁. It is a polyneuritis with two main forms, dry and wet, the latter being the more serious. Leading symptoms are tachycardia, weakness and oedema of the legs and paraesthesiae.

TREATMENT.—

General.—Put the patient to bed and watch the heart.

Medicinal.—Give vitamin B₁ in large quantities, i.e., 20–50 mg. of thiamine hydrochloride (Berin, aneurine, Betaxan, etc.) a day for the first week, then cut it down slowly until the patient is taking 6 mg. a day and finally 3 mg., which is the physiological requirement of the body. In severe cases give 20–50 mg. intravenously twice a day.

Diet.—As this disease occurs in rice eaters give atta instead of half the rice ration. (Many years ago in Burma the writer completely stopped a widespread outbreak by doing this.) Vegetables, eggs, milk, meat and liver also contain vitamin B₁. Marmite, Bemax and Thiomax contain a high proportion of vitamin B₁, enough, when taken in ordinary quantities, for maintenance but not for cure.

BIER'S PASSIVE HYPERAEMIA

Bier's idea was to treat infected tissues, especially joints, by deliberately producing hyperaemia, which is the principal phenomenon of inflammation. The success of this method of treatment is believed to depend upon the coincident working of bacteriolysis and phagocytosis. By increasing the pressure in the capillaries, the focus of infection is flooded with lymph having antitryptic and opsonic powers, arresting the further destructive action of ferments and inhibiting bacterial growth. When the pressure is removed, the lymph moves out of the affected part and exerts an influence upon the bactericidal power of the blood generally, by the stimulation of antitoxins, opsonins, alexins, etc.

Methods of application :

- (1) By an elastic bandage applied to an extremity.
- (2) By vacuum chambers, into which part of the limb is introduced.
- (3) By the use of Klapp's suction balls similar in action to the ordinary dry-cupping.

The cup method is the most generally useful. Cups are made to fit any part of the body, and are of various shapes and curves. The cup consists of a glass bowl with a heavy curved rim, with bulb attachment for exhausting the air. Care must be taken that the diameter of the cups exceeds the area of infiltration, and that the amount of pressure is carefully regulated, because, if the vacuum is too little, nothing is attained, and if too great, pain and white oedema are produced. The rim of the cup is greased with Vaseline, and while the bulb is compressed with the right hand, the cup is applied and the pressure slowly released. The skin and underlying tissues are sucked into the cup, hyperaemia appears as a red or bluish colouration, while pus, serum and blood ooze from the wound. After five minutes the cup is removed, the discharge wiped away, and the part allowed to rest for three minutes, whereupon the cup is again applied. This intermittent treatment is continued for about 45 minutes daily, the period being gradually diminished as the

discharge becomes thinner, and the granulations more healthy; a simple dressing is applied after each application.

The elastic bandage is made of soft rubber, 2½ inches wide, and sufficiently long to be wrapped six to eight times around the limb, as far above the affected area as possible. The bandage should be sufficiently tight to hinder the venous return, but not to diminish the arterial pulse or cause pain or coldness of the part. In a few minutes the limb becomes swollen, and of a deep red or purple colour up to the bandage, which remains on from 1 to 24 hours, according to the condition under treatment, but the position of the bandage should be changed after it has remained 10 hours in one place.

Bier's method has been used for the treatment of a great number of conditions. Its principal use is in the treatment of sinuses, fistulae, septic wounds, abscesses, carbuncles, buboes, and chronic inflammation of the joints.

BILHARZIA—See Worms.

BIRTH CONTROL

PHYSIOLOGY.—The seminal fluid is alkaline like the cervical canal, in which spermatozoa can survive for about 24 hours, but the vagina is slightly acid, so spermatozoa soon perish in it. It will, therefore, be seen that if the spermatozoa can be artificially prevented from entering the alkaline cervical canal and can then be exposed to an artificially increased acid medium in the vagina they will be destroyed before they can impregnate the ovum. This is the principle of some popular contraceptives.

APPLIANCES.—

For the *newly married*, the rubber sheath (French letter), worn by the man and well lubricated, should be advised for about the first two months, at the end of which the vagina will be more tolerant of a foreign body. If, however, the woman has been using Tampax, or some such sanitary protection, she may be able to insert one of the preventatives about to be described.

Mechanical devices must on no account be urged on a timid young woman, as they will only engender a distaste for marital relations, which may cause lifelong unhappiness for both partners.

The *Dutch cap* is a rubber diaphragm surrounded by a thicker rubber ring which occludes the upper vagina; it is sold in several sizes and should fit fairly accurately as, if it is too small, it may get displaced, whereas if it is too large it lies very obliquely. For a nulliparous woman an average diameter is 60–65 mm., and for a parous woman about 70–75 mm. Before insertion it is well lubricated on both sides with a spermicidal jelly, of which there are several on the market, the active principle being an antiseptic such as Chinosol, phenylmercuric acetate, chlorine or lactic acid (10%) in a tragacanth-glycerine base. The cap should be pushed as far up the vagina as possible (the squatting position is advantageous) and removed next day.

The cervical cap is hardly used now because it is apt to get displaced and is difficult to fit. A simple emergency method which many poor women have used for years is a piece of cotton-wool about the size of a hen's egg, soaked in equal parts of oil and vinegar; it must be completely removed next day. Coitus interruptus is a common cause of neurasthenia; no more need be said.

THE "SAFE PERIOD".—

This method of contraception, which is a great favourite with Roman Catholics and others whose religious or personal feelings forbid the use of mechanical barriers, is based on the following theory:

- (a) In a regularly menstruating woman, ovulation (i.e., escape of the ovum from the Graafian follicle) occurs 14 days before each monthly period. This time, however, may be altered by emotional or other upsets.
- (b) After ovulation the ovum does not survive for more than 12 hours.
- (c) Spermatozoa survive for less than 48 hours in the female genital tract.

In order to allow a slight margin either way, therefore, intercourse is avoided between the 16th and 13th days inclusive before the next monthly period is due. Educated women generally make a note of their periods in a diary or calendar; before the "safe period" method is adopted, the patient should know how regular she has been during the preceding 8 or 10 months, and add the number of days of any irregularities to the abstention period (e.g., if the menstrual cycle is apt to vary by four days the abstention period will be 8 instead of 4 days, 2 days being added at each end). Obviously the method is useless if menstruation is very irregular, but for the regularly menstruating woman, who will not be desperate if she conceives, it offers a simple and harmless method of birth control; the latest figures suggest that it is successful in about 95% of cases.

GRÄFENBURG'S RING.—Although condemned by most gynaecologists, this has its uses in suitable cases, and has the immense advantage that once it is inserted it may be left in a healthy uterus for years and no other precautions are necessary. It consists of a coiled coil of fine rustless steel wire made into a ring 2 cm. in diameter; this is inserted into the cavity of the uterus by means of a special introducer and can be removed by means of a special extractor. If the ring causes any symptoms whatever, it should be removed. It is not absolutely conception-proof but very nearly so, and it should be used only in a perfectly clean, healthy uterus.

RESECTION OF THE FALLOPIAN TUBES.—It has been observed that at the time of ovulation the Fallopian tube curls over the ovary, to which the fimbriated end becomes applied, thus facilitating entry of the ovum. If, therefore, the fimbriated ends of the tubes are buried between the layers of the broad ligaments, conception is successfully prevented, but the woman is not irrevoc-

ahly sterilized, a fact of great psychological value in many people. The method is therefore recommended instead of resection of the whole or part of the Fallopian tubes.

BIRTH PALSY

This is due to traction on the brachial plexus in difficult labour, either head or breech presentation. The injury is usually to the fifth or fifth and sixth nerves, so that the arm is held to the side, rotated in, and the elbow extended, with some pronation of the forearm. Treatment consists in fixing the arm in a splint in such a position that the paralysed muscles are relaxed; the splint is worn day and night.

BLACKWATER FEVER

Normal blood serum contains an anti-haemolytic factor which protects healthy red cells from dissolution, but permits the lysis of worn-out old cells which has to go on to keep the blood healthy. In blackwater fever this factor, the composition of which is not yet known (but some day we hope it will be) is seriously lacking, so the haemolytic factor normally present in the tissues has unrestrained liberty and vast numbers of cells are destroyed.

Destruction of the anti-haemolytic factor is brought about by a combination of:

- (1) Attacks of malaria (generally M.T., sometimes mixed M.T. and B.T.) over several months. Possibly, owing to repeated doses of haemolysed red cells, the patient becomes immunized to them.
- (2) A large dose of quinine.
- (3) Exertion.
- (4) Possible shortage of vitamin K.

It is commonest in those regions where severe malaria is endemic, such as West Africa, Greece and parts of Assam and Burma, and may occur in patients who have lived in, but have left, such areas. It is commonest in Europeans.

TREATMENT.—This may be summed up as:

- (1) Complete rest in bed.
- (2) Good nursing.
- (3) Alkaline fluids (e.g., barley or glucose water with a drachm of sodium bicarbonate and half an ounce of potassium or sodium citrate to the pint).
- (4) Alkaline glucose saline (salt one drachm, sodium bicarbonate two drachms, glucose one ounce, to each pint of water) should be given intravenously; up to 2 to 4 pints in 24 hours.
- (5) Never give quinine.
- (6) Examine the blood, and *if parasites are present* give mepacrine one tablet t.d.s., or, preferably, a tablet (100 mg.) of Paludrine, t.d.s.
- (7) If there is anuria, apply hot fomentations to the loins; Napier

recommends hot colonic washes followed by filling the bladder with 2% citrate saline, which the patient passes by the ordinary act of micturition; this may start secretion of urine.

- (8) Blood transfusion may be tried if there is much anaemia, and is indicated when the haemoglobin is below 40% or the red cells below 2,000,000. It must not be given when there is anuria.

- (9) Do not move the patient, even if he is lying in a hut.

Of all the above measures, alkalization is the most important because it prevents the precipitation of acid haematin in the renal tubules with consequent anuria.

AFTER-TREATMENT.—Keep the patient in bed for at least a fortnight after the disappearance of haemoglobinuria and watch the heart, because sudden heart failure is not uncommon during convalescence.

BLADDER, RUPTURED

The rupture may be intraperitoneal (80%) or extraperitoneal (generally associated with a fractured pelvis).

A catheter passed through the urethra withdraws only a few drops of blood-stained urine and if a measured quantity of sterile saline is introduced only some of it will be returned.

If X-rays are available and the above test is inconclusive, Hamilton Bailey recommends the introduction of some 2% sodium iodide solution, which is radio-opaque, followed by taking an X-ray picture. His *treatment* is as follows:

When shock, if present, has been dealt with, the peritoneum is opened and if full of urine this is swabbed or sucked out, and the peritoneum freely powdered with sulphasiline powder. The peritoneum is then stripped off the bladder, the latter opened extraperitoneally, a finger introduced, the interior of the bladder explored, the rupture sewn up from the outside, the peritoneum closed, and a large drainage tube introduced into the bladder through the extraperitoneal incision.

If the rupture is extraperitoneal, the bladder is exposed suprapubically and drained, either through the rupture or through an anterior incision.

BLADDER, STONE IN—See *Calculi*.

BLISTERS

Cantharidin is used, either in the form of a plaster (*Emplastrum Calefaciens B.P.C.*) or in solution in collodion (*Collodium Vesicans B.P.C.*).

The application should not exceed one inch in diameter, applied to the carefully cleansed skin. It remains on from 4 to 8 hours, according to the effect desired, and is removed by carefully detaching and elevating the sides. The blister is then punctured, the serum drained off, and the surface protected by a dressing of sterile gauze.

If, at the end of 8 hours, vesication has not occurred, a hot fomentation will produce the exudation. The skin should never be clipped away.

BLOOD-PRESSURE—See Arteriosclerosis.

BLOOD SEDIMENTATION RATE—See Laboratory Methods.

BLOOD TRANSFUSION (See also Shock.)

There are two methods, the direct and the citrated; the latter is almost universal because stored blood from a blood bank can be used and because clotting is eliminated. The only direct method now used employs a special apparatus such as the Pennell (Haslam & Co. 83 Pulaski Street, Brooklyn, N.Y., U.S.A.), by which the amount of blood passing is accurately measured; needless to say, pure fresh blood is better than citrated blood.

A blood donor must be free from disease, especially syphilis and malaria and he must belong to a group which is compatible with that of the recipient.

There are four blood groups, usually called 1, 2, 3 and 4; the newer grouping into AB, A, B and O is more satisfying to the laboratory technician because it expresses his theories of the reason for the different groups, but theories change and it is harder for the clinician to remember, so 1, 2, 3 and 4 will be used here.

The important thing to know is *the effect the serum of the recipient will have on the cells of the donor*, because it is obvious that there will be trouble if the millions of red cells being injected into the patient are agglutinated or haemolysed by him. It has been found that group 4 cells are not agglutinated by any serum, so group 4 is known as the universal donor. Similarly group 1 serum does not agglutinate the cells of any group, so group 1 is known as the universal recipient. Among Europeans about 45% belong to group 4, and 45% to group 2; but amongst Indians the proportions are about 30% group 4, 18% group 2, and 40% group 3; in all races group 1 is the rarest.

To find out which group a person belongs to, it is necessary to have a tube of group 2 and a tube of group 3 serum, obtainable from most laboratories.

- (1) Take two pieces of stamp paper; on one write 2, on the other 3, and stick them on a white plate or tile, or write 2 and 3 with a glass pencil.
- (2) Under 2 put a drop of group 2 serum and under 3 a drop of group 3 serum.
- (3) With a match stick mix a small drop of the patient's blood (enough to colour the mixture pink) with serum 2 and with another match stick mix a similar drop with serum 3.
- (4) Rock the plate gently and see what happens.
- (5) If agglutination occurs it is quite obvious, especially under a magnifying lens; the red cells settle into clumps about the size of grains of sand.

- (6) If no agglutination occurs within five minutes the groups are compatible.

Four results are possible, as follows (Yes means that agglutination takes place, No means it does not):

<i>Serum 2</i>	<i>Serum 3</i>	<i>Group of blood being tested</i>
Yes	Yes	1
No	Yes	2
Yes	No	3
No	No	4

Even if the groups are known it is absolutely essential to test the donor's blood against the serum of the recipient; this is done by withdrawing a few c.c. of the recipient's blood, allowing it to clot and then testing a drop of the serum against the donor's blood as described above. If agglutination occurs the blood must on no account be given. In cases of urgency this direct test is sufficient, without the grouping test.

In jails where there are long-term prisoners it is convenient to have their bloods grouped, those in group 4 being listed as donors and given a reward or a slight remission for each donation. Some patients insist on the observance of caste restrictions, in which case a near relative is a useful donor.

METHOD.—

- (1) Sterilize the needle it is proposed to use together with the attached rubber tubing; the tubing should be about 12 inches long. French's blood transfusion needle is the best, but Canti's and Keyne's are both good (Allen & Hanbury Nos. 1828, 1825 and 1830 respectively). If these are unobtainable use any wide-bore short needle, which should be at least as thick as a match stick.
- (2) Into a sterile flask or colourless bottle of more than one pint capacity (a whisky or gin bottle holds 24 or 26 ounces) put a warm sterile solution of 2 grammes (gr. 30) of citrate of soda in 100 c.c. (3½ oz.) of distilled water (pyrogen-free if obtainable).
- (3) Put a similar quantity into a sterile tray or basin and then put the sterilized needle and tube in it.
- (4) Lay the donor (whose blood has been previously tested against the recipient's serum) on a couch, inject a few drops of 2% Novocain into the sterilized skin over the proposed site of puncture, put a sphygmomanometer cuff round his arm, blow it up to 40–60 mm. Hg, and give him a rolled bandage to hold.
- (5) When the selected vein is fully distended, take the transfusion needle, put the other end of the attached tubing through the neck of the flask or bottle containing the citrate solution and give the latter to the assistant to hold.
- (6) Insert the needle into the vein and tell the donor to open his

hand, and to grip the bandage alternately. This produces a pump action which prevents clotting.

- (7) The assistant now lowers the bottle about 8 inches so as to allow the force of gravity in the tube to help the flow of blood; he gently moves the bottle round and round so as to mix the blood and citrate solution, and he keeps an eye on the sphygmomanometer, pumping it up to 60 if it gets below 30.
- (8) The surgeon watches the needle and keeps it in the vein, casting a glance from time to time at the flowing blood.
- (9) When a pint has been drawn off, deflate the sphygmomanometer, apply a sterile swab to the puncture, remove the needle and raise the donor's arm. Bandage the swab to the arm; the swab may be taken off after a few hours.
- (10) Put the bottle of blood in a basin of warm (110° F.) water to keep it warm.

INJECTING THE BLOOD INTO THE PATIENT.—This is best done through a funnel and tube, in the same way as an intravenous saline is given.

REACTIONS.—These are uncommon if the precautions noted are carried out adequately, but it may be taken as a general rule that the transfusion should be stopped if any untoward symptoms arise. The commonest cause of rigors appears to be the presence of old blood in the apparatus so everything should be well washed in cold water directly after use; this is cheaper than using a new tube for every transfusion. Ephedrine and adrenaline injections often give relief if the patient feels ill or uncomfortable. A point worth remembering is that the same donor should not be used for the same patient after an interval of several weeks or there may be symptoms of anaphylaxis.

WITHDRAWING BLOOD FOR STORAGE (BLOOD BANK).

—The method is the same as described above except that the blood is sucked into a vacuum bottle containing the necessary amount of citrate solution, a needle being thrust through the rubber cap.

GIVING BLOOD FROM A BLOOD BANK.—Although the group of the stored blood is known, a drop of it must be tested against the patient's serum before being given. Except in emergency it is warmed to 103° F.; it is gently mixed by turning the bottle upside down once or twice. It should be poured from the original container either through the special filter provided or through about 6 layers of sterile gauze. These are the main points; special instructions are issued with the stored blood.

BOILS

LOCAL TREATMENT.—When seen very early they may sometimes be aborted by washing the affected and neighbouring skin with spirit, ether or petrol and applying the following cream.

R. Penicillin	..	..	..	..	200,000 units
Sulphathiazole	..	..	..	..	3j
Zinc Oxide	..	..	..	..	3j
Cod-liver Oil ^{ad}	..	..	..	..	3j

If a boil is coming to a head, apply glycerin-mag. sulph. paste on a gauze dressing once a day.

After rupture or incision of a boil, smear the surrounding skin freely with the above paste to prevent local infection. The boil itself may be dressed with glycerin-mag. suppl. paste, Antiphlogistine or fomentations.

An unruptured, painful boil should be incised.

GENERAL TREATMENT.—

- (1) Change of air to dry bracing climate whenever possible.
- (2) Cut down fats in diet.
- (3) Give Stannoxyl 4 tablets b.d. or sulphathiazole 2 tablets 4 times a day.
- (4) Examine the urine for sugar.
- (5) In very bad cases give penicillin, but its effect is temporary.
- (6) In chronic cases have an autogenous vaccine made.
- (7) Relieve pain by aspirin gr. 5 every 3 hours.

BONE INFLAMMATION

ACUTE OSTEOMYELITIS.—This is diagnosed by the classical signs of inflammation, which are redness, swelling, heat, pain, tenderness and loss of function. The common sites are the ends of long bones, particularly near the knee; the patient is usually (3 to 1) a boy, and he is usually acutely ill with high fever. The classical history is one of a septic focus, such as a sore throat, a boil or an infected wound, and a minor injury to a bone followed in a few days by the symptoms described above. Cases, however, vary; any bone, including the skull and the jaw (especially after tooth extraction) may be affected, and there may be no obvious septic focus. However, in the presence of severe inflammation with much pain and illness, suspect osteomyelitis, not rheumatism. Distinguish from acute arthritis by the fact that the joint can be moved carefully without pain.

About 70% of the number of cases are due to the *Staphylococcus aureus*, the remainder to the *Staphylococcus albus* and the streptococcus, probably about 12% each, and the pneumococcus about 6%. Mixed infections occasionally occur.

TREATMENT.—This is by chemotherapy in cases seen within the first four days and by chemotherapy and operation in those seen later. Penicillin is given in full doses until the temperature has been normal and symptoms absent for 48–72 hours.

If the case is first seen four days after the onset of symptoms, necrosis of bone has almost certainly taken place and it is best to open the bone, by means of a drill or chisel, at the affected area. The wound should be packed with penicillin-sulphathiazole-Vaseline gauze, the limb immobilized in plaster of Paris, injections of penicillin, or sulphathiazole by the mouth, given and the patient treated in the healthiest possible surroundings.

Instead of packing the wound, another method is to evacuate pus and replace it by penicillin solution 5,000 units per c.c. once a day.

Sequestra take 6 to 8 weeks to form, and no attempt should be made to remove them until they are loose.

Within the first 10 days an X-ray picture is valueless and time should not be wasted in taking or waiting for it.

In the absence of penicillin, treatment is by operation, sulphonamides, plaster of Paris, Vaseline gauze and fresh air.

CHRONIC OSTEOMYELITIS.—Unfortunately, in India this is more commonly seen than the acute variety. Points in treatment are the same as above, except that an X-ray picture must be taken to show the condition of the bone and the presence or absence of sequestra; again it is emphasized that these are not removed until they are loose, although considerable chiselling may be necessary to get at them. Under careful chemotherapy these cases get well much more quickly than they used to do, but it is essential to build up the general health.

BOTULISM

As this rare disease is due to swallowing the poison and not the organisms, generally in pork sausages, treatment is symptomatic with alcohol, ether and strychnine. The anti-serum, if available, is given intravenously, 20-50 c.c. daily.

BRAIN ABSCESS

This is most commonly caused by direct extension from a chronically suppurating middle ear, especially with cholesteatoma, when the abscess is in the temporal lobe, or from a lateral sinus thrombosis or suppurating mastoid, when it is in the cerebellum; it may also follow trauma. Sometimes sepsis from a frontal sinus spreads through the bone and causes an abscess in the frontal lobe, or tuberculous or syphilitic osteitis may become secondarily infected.

Cerebral abscess sometimes terminates life in bronchiectasis or other suppurative lung condition, from migration of a septic embolus through the pulmonary vein to the left heart and thence to the brain. In cases of pyaemia brain abscess may also develop.

An early symptom is lack of mental concentration, sometimes accompanied by drowsiness, and cerebral abscess should always be suspected if these symptoms are present in a patient with chronic suppurative ear disease.

Later, come headache, vomiting and sometimes papilloedema from increased pressure, while rigors and fever mean that the inflammation is active, calling for immediate chemotherapy.

TREATMENT.—Vigorous chemotherapy is begun at once, with both penicillin and sulphonamides.

If a local condition such as otitis media gives a clue to the situation, the causative lesion should be opened up and the dura and abscess opened through the hole thus made. If there is bilateral ear disease, there may be spasticity of the limbs, and a positive Babinski on the opposite side to a temporal lobe abscess, or incoordination on the same side as a cerebellar abscess. The dura should be widely

exposed, and if there is no obvious indication of the whereabouts of the abscess, incise the dura and probe the brain gently with an exploring needle fitted with a blunt obturator. If a lumbar puncture needle is used, slip a rubber drainage tube over the proximal end before beginning the operation and thread it over the needle when the abscess is found. Do not mistake brain matter for pus. It is usually safe to push the needle in 2 inches but it should not be pushed upwards for fear of entering a lateral ventricle.

BRAIN TUMOUR—See Nervous System.

BREAST, DISEASES OF

ENGORGEMENT.—Pathological engorgement due to hormone activity sometimes occurs soon after birth, at puberty, or during pregnancy. It can be relieved by oestrogen injections 10–50,000 units, repeated as necessary, supplemented by local measures such as a belladonna plaster. Oral oestrogens are also effective.

ACUTE INFLAMMATION.—This occurs chiefly in a primipara during lactation, is generally due to infection from a cracked nipple, and is aggravated by milk retention.

PREVENTION.—During the last three months of pregnancy the patient should massage her nipples with lanoline every night (drawing them out, if retracted) and rub them with alcohol every morning. As time goes on, the massage should be done more and more firmly and when the skin is tough enough the nipples are washed with a soapy flannel; later, they may even be scrubbed with a nailbrush. It is now considered unwise to leave a baby on the nipple for more than two minutes until the supply of milk is established.

After every feed the nipples must be cleansed and dried, and during the first two weeks it is a good thing to dust on a little Cibazol or similar powder, which is washed off with boric lotion before the next feed.

If cracks occur, the well-tried Tinct. Benzoin. Co. is an excellent application.

Tender or painful nipples should be anointed with a little local anaesthetic ointment, such as Anethaine or Nupercainal, half an hour before feeding, redundant ointment being carefully wiped off. A nipple shield, with the tip of the rubber teat cut off, so that the child does not have to overcome double resistance, is a great help. Chemotherapy is also given.

ABSCCESS OF THE BREAST.—Classically this occurs in one of three situations, subcutaneous, retromammary and intramammary. The first is the result of a minor skin infection and is cured by a small incision, and the second is often due to some extramammary cause such as an infected blood clot, an inflamed rib or an empyema; it should be opened at the lower and outer margin of the breast, and the cause ascertained and treated.

Intramammary abscess is the sequel of acute inflammation, takes

a few days to develop and is extremely painful. Treatment is carried out as described under "Abscess", but certain special points require attention. Chemotherapy is essential.

Early incision is a mistake; the abscess must be allowed to localize—this can be helped by local heat or Antiphlogistine.

When incision is necessary, it should be radial, otherwise milk ducts are cut across, causing spread and leakage.

The abscess is often loculated, so a finger may be introduced and any loculi felt are gently broken down.

Drainage must be free and the incision should be in the lower quadrant whenever possible.

The question of stopping breast feeding is sometimes a difficult one. If both breasts are affected, it is better to stop at once. If one breast is affected, the milk may be drawn off with a breast-pump, or by the infant when the infection is completely localized or cured.

To stop the milk supply, give 50,000 units of oestrogen every other day for three or four doses. Saline purges, abstinence from fluids and the application of a belladonna plaster may also be employed.

CHRONIC INTERSTITIAL MASTITIS.—This is not uncommon towards the menopause, but sometimes occurs in young women. It is not a true inflammation, although characterized by fibrosis and often by cyst formation, but is probably due to an excess of ovarian secretion. Those cases in which pain is worse just before a period, or about half-way between two periods, do very well on injection of male hormone; 25 mg. of testosterone propionate, e.g., Perandren, twice weekly during the second half of each menstrual cycle is an average successful dose. Excessive dosage must be avoided and symptoms of masculinity carefully watched for.

Local treatment is by belladonna plasters. If the swelling is large or cystic, put in a needle; withdrawal of fluid negatives malignancy. If other treatment is unsuccessful, amputation of the breast or removal of the affected area should be considered. The condition is generally bilateral and occasionally one or both sides may become malignant.

TUBERCULOUS MASTITIS.—This is rare and sinuses are usually present with typical granulations. It may closely resemble malignant disease. Treatment is removal of the breast and glands, but not of the underlying tissue unless affected.

ACTINOMYCOSIS.—This occasionally affects the breast, the typical sulphur granules, seen under the microscope to be clumps of actinomyces, being present in the pus. Treatment is by penicillin and sulphonamides.

INNOCENT TUMOURS.—

Fibroma may be soft or hard, the former being the commoner and usually the larger. A fibroma is freely movable in the substance of the breast and has a definite rounded outline.

Duct Papilloma is the other common innocent tumour, a serous or blood-stained discharge from the nipple being the typical sign.

Treatment of all the above is local removal and examination of the specimen to exclude malignancy.

MALIGNANT TUMOURS.—For a full discussion the reader is referred to works on surgery and pathology, but a few important points deserve notice.

Scirrhus Carcinoma is the common tumour and is characterized by its hardness, immobility within the substance of the breast, its singleness, and its palpability with the flat of the hand. The nipple on the affected side is often higher than the other and the axillary glands are generally enlarged. The upper and outer quadrant is most commonly affected.

Encephaloid Carcinoma is a rapidly growing, highly malignant form which ulcerates early.

Paget's Disease of the Nipple is a chronic eczema with underlying carcinoma.

Duct Carcinoma sometimes follows the duct papilloma already described.

Treatment.—All the above are treated by radical operation followed by X-ray irradiation or radium after about six weeks.

Sarcoma forms about 2% of malignant breast tumours; the larger and softer it is, the more malignant. It fungates early and is usually fatal. The spindle-celled variety, being slightly more highly organized than the round-celled is harder and less malignant but often recurs locally after apparently complete removal. Melanotic sarcoma is also known.

BREATH, OFFENSIVE

A clean life and a clean mouth are the great enemies of bad breath.

As the smell generally comes from the gingival margins or from decayed or merely dirty teeth, these are carefully examined, the gums are pressed to show up any pus present, and the patient sent to a good dentist. Treatment includes extraction of loose or septic teeth and instructing the patient to clean his teeth thoroughly at least twice a day. Dentures should be removed at night and kept in a solution of one of the denture cleaners.

The tonsils, the nasopharynx and the tongue are also examined.

Constipation, indigestion, sedentary habits, fasting, sleeping in a stuffy room or under the bedclothes, alcohol, tobacco, spiced curries, sinusitis and pān chewing (which causes pyorrhoea and sometimes cancer of the cheek) are common causes; rare causes are ozaena, bronchiectasis, and abscess or gangrene of the lung.

BRIGHT'S DISEASE—See Nephritis.

BRONCHIECTASIS

This is not common in India.

The essential pathology is an ulcerative, destructive inflammation of the bronchi, which become dilated, fibrotic and full of pus; the neighbouring lung is generally fibrotic too. Bronchiectasis is

commonest in the lower lobes of the lungs, chiefly in the posterior part, and the left side is affected oftener than the right.

Most commonly it follows a broncho-pneumonia which does not resolve properly, and which may be preceded by influenza, measles or whooping-cough. Occasionally, a foreign body, such as a tooth or a grain of rice is inhaled, and by blocking a bronchus causes retention of secretion, with consequent ulceration, fibrosis and dilatation of the bronchioles leading into it; a tumour pressing on a bronchus can have the same effect. Treatment in these cases is removal of the cause.

Prevention of bronchiectasis, apart from not allowing people to inhale foreign bodies, consists in taking great care over the convalescence of patients with infections of the lung or bronchi.

The symptoms and signs are simple and characteristic, namely, a tickly, tinkly cough, with profuse purulent morning sputum, which may or may not have a horrible and pathognomonic smell. Clubbing of the fingers is generally present and should always be looked for as its presence confirms the diagnosis.

Dullness with musical rales at the base is present but disappears if the patient is inverted and coughs up the pus. Evening temperature is usual, as also is breathlessness, but wasting is rare and tubercle bacilli are absent from the sputum.

Lipiodol injection followed by radiography is essential, because by showing the precise extent of the disease it forms the only accurate guide to treatment. It is carried out as follows:

- (1) The patient hangs over the edge of the bed and empties his lungs of sputum.
- (2) Take the patient to the X-ray room and lay him on a couch.
- (3) With the patient's head extended, inject some 2% Novocain into the skin and tissues overlying the crico-thyroid membrane.
- (4) Through the anesthetized area, and with the patient lying quite flat, inject about $\frac{1}{2}$ c.c. of 5% cocaine into the trachea.
- (5) Fill a syringe with 20 c.c. Lipiodol warmed to a degree or two above blood heat, and fit a fairly wide-bore needle.
- (6) With the patient half sitting up, leaning towards the suspected side, and with his head partly extended, insert the needle of the syringe through the crico-thyroid membrane into the trachea, confirming that the needle is really in by withdrawing a little air through it.
- (7) Inject the Lipiodol and hand the patient over to the radiologist.

In nervous patients a preliminary sedative should be given; children require a general instead of a local anaesthetic.

The occasional administrator will find this method simpler and more certain than passing a catheter between the vocal cords.

TREATMENT.—This is postural, medicinal and surgical.

Postural.—Bronchiectasis can be visualized as a collection of abscesses at the end of the bronchial tree, so it will be easily seen that they could be drained by standing the patient on his head.

As this is not practicable, the patient should lean right over the side of his bed, or be put on a bed or table with the head end about a foot or eighteen inches lower than the other end; this is done for half an hour, at least twice a day. A bronchiectasis bed can easily be made by joining together at an angle of 135 degrees two boards each 3 ft. by 3 ft. The patient's bedding is put over this and he sleeps face downwards, the join in the boards being below his abdomen. Some patients cannot tolerate the position and cough so much that they cannot sleep, but children are often quite happy and derive great benefit, early cases even being curable.

Medicinal.—Sulphonamides and penicillin are always worth trying, combined with the postural treatment described above; success can be expected in early cases without much fibrosis, but only temporary improvement in others.

For disguising the horrible smell, Yeo's prescription, acid. carbolic. liq., creosote, spirit. chloroformi, two parts of each, spirit. aetheris, tinct. iodi, one part of each, is about the best. A few drops are put on a Yeo's inhaler, which is worn for increasing periods. Internally, capsules of creosote 10-20 minims t.d.s. help, because some of the drug is excreted through the lungs, but it often upsets the digestion. A creosote vapour bath is also used.

SURGICAL METHODS

Branchoscopic drainage and irrigation with penicillin 1,000 units per c.c. may be successful in very localized cases.

Collapse therapy.—Take a stethoscope; you can squeeze the soft rubber tubing between your fingers, but not the hard metal earpieces. In the same way collapse therapy, whether by artificial pneumothorax, phrenic interruption or even thoracoplasty, can compress soft, recently inflamed small bronchi, but not the hard, fibrotic, gas-pipe-like tubes so typical of the later stages.

Pneumonectomy and lobectomy.—In unilateral cases and in the hands of the expert this is the method of choice, many complete cures having been recorded.

BRONCHITIS, ACUTE

If the attack is severe the patient should be in bed in a room with a temperature of 60° to 65° F.; he should be propped up in the bed, and wear light but warm clothing. The air may be moistened with a steam kettle to which has been added Tr. Benzoin. Co. ʒj to the pint or oil of eucalyptus 5 ℥ to the pint. The diet should be fluid and plenty of hot drinks should be taken.

Drug treatment consists in giving one of the sulphonamides or penicillin to cure the disease, aided by aspirin gr. 5-10 three times a day to increase comfort and diminish fever; Pulv. Ipecac. Co. gr. 15 at night also helps. A simple expectorant mixture such as:

R. Ammon. Carb.	..	..	..	..	gr. 3
Tinct. Ipecac.	..	..	..	..	℥ 15
Tinct. Scillae	..	..	..	..	℥ 15
Tinct. Camph. Co.	..	..	..	..	℥ 30
Aq. ad	..	..	..	..	ʒss

may be given three times a day in the early stages when the sputum is sticky. Iodide of potassium is a good expectorant, but in India it causes iodism with such alarming frequency that the writer has given it up.

An irritating cough may develop towards the end of the attack, when the following prescription will be found valuable:

R	Syrup. Codein. Phos.	} of each ℥ 30
	Syrup. Pruni Virg (Serotina)	..	..	..
	Tinct. Camph. Co.	..	..	..
	Glycerin.	..	..	..

A dessertspoonful to be swallowed slowly not more than four times in 24 hours when the cough is troublesome. Heroin, gr. $\frac{1}{12}$, may be added in obstinate cases. The old household remedy of honey, lemon, rum and hot water, taken last thing at night, is also excellent.

In children

A warm, moist atmosphere, often induced by a bronchitis kettle, with a drachm of Tinct. Benzoin. Co. to each pint of water, is essential, and clothing should be light, preferably of wool, which does not become sodden. Sulphonamides are given in appropriate doses, the chest is rubbed twice daily with camphorated oil, the bowels are kept open with Hydrarg. cum Cret. powders and a diaphoretic expectorant mixture such as the following is given:

R	Pot Cit	..	..	..	..	gr. 10
	Tinct. Ipecac.	..	..	..	..	℥ 8
	Liq. Ammon. Acetat.	..	..	..	..	℥ 30
	Spirit. Aethers Nit.	..	..	..	..	℥ 15
	Aq. Camph. ad	..	..	..	..	3ij

Dose: 2 drachms four-hourly.

To clear the chest in children there is nothing like an emetic, such as a dessertspoonful or two of Tinct. Ipecac., or half a grain of tartar emetic in water.

BRONCHITIS, CHRONIC

When bronchitis has become chronic it is almost invariably associated with emphysema, and treatment must be directed towards preventing the acute recurrent attacks. Steps must be taken to ascertain and remove the cause, such as dusty surroundings, abnormal conditions of the upper air passages such as polypi, deviated septum, pus in the antra, etc.

In India, tuberculosis is far commoner than chronic bronchitis, so it must be excluded by repeated examination of the sputum and by X-ray examination. If the sputum is very profuse, or has a bad odour, suspect bronchiectasis, especially if there is any clubbing of the fingers. When there is a dry, hacking cough, worse at night, examine the blood for eosinophilia. (See Eosinophilia, Tropical.)

TREATMENT.—Climate is an important factor for adults. It should be warm and dry without sudden changes; children, however, are better in a cold, dry, bracing place. Active immunization by means of an autogenous vaccine taken from the nasopharynx

is beneficial in some cases, but very small doses should be given and reactions avoided.

The sulphonamides and penicillin are useful in clearing up a large part of the infection, but they cannot replace lost ciliated epithelium or turn fibrous into active tissue; they should, however, always be given a fair trial.

In the "wet" type of the disease, with profuse sputum, the following prescription is useful, especially if there is an asthmatic tendency:

R.	Ephedrine Hydrochlor	.	.	gr. $\frac{1}{2}$
	Tinct. Stramonii	.	.	℥ 15
	Tinct. Belladonnæ	.	.	℥ 5 (this may be increased gradually)
	Tinct. Hyoscyami	.	..	℥ 30
	Tinct. Camph. Co	..	.	℥ 30
	Aq. ad	..	.	℥ ss

If, on the other hand, the sputum is dry and sticky, give a stimulating expectorant such as that recommended above for early acute bronchitis. External applications such as camphorated oil or Little's Oriental Balm are also helpful and create a pleasant odour.

BRONCHO-PNEUMONIA

While this form of pneumonia may occur as a primary condition due to the pneumococcus, and then generally in children under two years, it also occurs as a complication of infectious conditions such as measles, influenza and whooping-cough, as an extension of acute bronchitis and as a terminal state in many diseases. A very serious type is septic broncho-pneumonia due to inhalation of septic liquid or of foreign bodies.

TREATMENT.—Sulphonamides are essential, assisted by penicillin in severe or refractory cases.

Auxiliary forms of treatment are fresh air, neither too hot nor too cold, and moistened if necessary by a bronchitis kettle, light warm clothing, easily digested nourishment such as glucose water, Horlick's Milk or Benger's Food. The heart is supported by Coramine or nikethamide and nasal oxygen may be given in serious cases. Restlessness can be overcome by barbiturates, with or without aspirin or phenacetin, and in the early stages the bowels should be opened by a dose of castor oil.

A careful convalescence must be insisted on, otherwise there is great danger of pleurisy, empyema, bronchiectasis or even tuberculosis.

The treatment of broncho-pneumonia in infants is on similar lines and requires the greatest care and watchfulness especially when, as often happens, the disease attacks a child already debilitated by some other disease such as measles, whooping-cough, bronchitis or malaria. Whenever possible, a competent nurse should be provided, or the child accommodated in a private ward, and the doctor should see the patient at least three times a day until danger is past.

BUBO (*See also Venereal Diseases.*)

- (a) Look for a cause such as a sore on the leg or on the genitals.
- (b) Look for enlargement of other glands.
- (c) If fluctuation is present, aspirate the pus and inject one or two c.c. of penicillin, 5,000 units per c.c.
- (d) If the skin is about to break down, make a small incision and treat as an abscess.

BUBONIC PLAGUE—*See Plague (Bubonic).***BUNION**

In the first place an endeavour should be made to cure the condition by suitable shoes. Operative treatment by excising the bursa and the inner quarter or so of the metatarsal head will give relief.

BURNS AND SCALDS

Burns are usually divided into three degrees:

- (1) Skin hyperaemic.
- (2) Skin partly destroyed.
- (3) Skin totally destroyed and perhaps underlying structures too.

From this simple classification certain deductions can be made:

In (1) there will be no scarring.

In (2) there may be scarring but there will be no contracture.

In (3) there will be scarring with contracture.

In (1) there is no loss of plasma and little pain.

In (2) much plasma may be lost, and pain is severe from the tender exposed nerve endings.

In (3) much plasma may be lost, and pain is often less severe than in the second degree.

In (1) there will be no sepsis.

In (2) superficial sepsis may be widespread.

In (3) sepsis may be very severe.

Thus we already have a general guide to treatment, which is to relieve pain, to treat shock, to prevent loss of plasma and replace that which is lost, to prevent sepsis and to prevent contractures.

Pain is relieved by morphia, which may have to be given in large doses, e.g., $\frac{1}{2}$ grain followed by $\frac{1}{4}$ grain two-hourly. If a patient is in pain half an hour after an injection of morphia, he has not had enough, no matter how much he has had. Local treatment (see below) also helps to relieve pain.

Shock.—General measures such as warmth, absolute rest, hot drinks and morphia are helpful. Blood transfusion is not indicated in the early treatment of burns because it is plasma that is lost, so the remaining blood is already over-concentrated. After a week or two, however, anaemia is very common in extensive burns, so blood transfusion is needed.

COAGULANTS.—Those substances possess certain advantages, namely, ease of application, relief of pain, prevention of plasma

loss and prevention of toxic absorption. They must not be used on the face, the hands or the feet because they tend to contract and may cause distortion of features and constriction of a limb; for this reason a limb should never be completely surrounded with a coagulant. Triple Dye (gentian violet 1%, flavine and brilliant green of each 0.1%) is about the best. After the burnt area has been well cleaned with spirit and ether the dye is sprayed on, or painted on with a gauze swab, each application being dried as quickly as possible with the help of a fan; two or three layers generally suffice. Burroughs Wellcome's Triofax is an excellent modification because being a jelly it can be gently spread on and one layer is sufficient. No attempt to clean a large burn should be made until shock has been dealt with. If a general anaesthetic is needed, gas and oxygen is the best, but in India it is not usually obtainable, so we have to content ourselves with ethyl chloride or ether. Intravenous barbitrates are not usually advised because the toxins from the burn may have damaged the liver.

Ten per cent solution of silver nitrate in distilled water is another good coagulant but tannic acid 10% has rather gone out of fashion. The coagulum is left on until it becomes loose and no dressing except a light, gauze bandage or a sterile towel is necessary. It is essential to keep the coagulum absolutely dry.

PROFLAVINE.—R. W. Raven (*British Medical Journal*, 24/2/45) recommends the following method:

"Wound treatment is carried out under strictly aseptic conditions in the operating theatre, usually without general anaesthesia; morphine should be administered subcutaneously half an hour before the operation, and in severe cases this can be given intravenously with good effect. The toilet of the wound is careful and conservative. Contaminants are mopped away with a solution of normal saline, and pieces of dead tissue are lifted off. Normal skin surrounding the wound is carefully cleansed with spirit. Blisters are evacuated carefully by pricking with a sterile needle. Dry proflavine powder is lightly smeared over the wound, the whole lesion being thinly coated. The wound area is covered with one layer of wide-meshed gauze impregnated with Vaseline and, over this, two layers of wide-meshed gauze with a liberal supply of cotton-wool. The dressing is bandaged firmly to form a pressure-dressing with either plaster-of-Paris or calico bandages, and this initial dressing is not removed for a minimal period of five days. After the first re-dressing the time interval between dressings is increased from 10–14 days. Proflavine powder is dusted on the wound at each re-dressing. The wounds in burns of third degree should be skin grafted as soon as they are in a satisfactory state.

"USE OF PLASTER OF PARIS.—We have with advantage used plaster coverings for the dressing in certain parts of the body. Attention is called to the value of the 'plaster-glove' for the treatment of burns of the hand. The toilet is carried out as described, each finger being covered separately with Vaseline gauze and dry

gauze. The following technique is employed for the application of the 'plaster-glove'.

"The patient is instructed to place the hand in the position of rest, the fingers being partially flexed at the interphalangeal and metacarpo-phalangeal joints, with the tips of the index finger and thumb in opposition. The wrist-joint is held in partial dorsiflexion. A rolled pad of cotton-wool is placed in the palm of the hand as a support for the fingers, and the hand and forearm are covered with a liberal supply of that material. The hand, wrist and forearm are then encased completely in the 'plaster-glove', which extends as high as a point two inches below the elbow-joint. The limb is elevated for several days in order to minimize tissue oedema. Active exercises are instituted for the fingers after 48 hours, together with active exercises at the elbow and shoulder-joints.

"In the case of burns of the foot a similar technique is employed. The glove is left in position for a period of two to three weeks. Other regions of the body have been treated by the proflavine-plaster technique, including the leg, thigh, forearm, arm, shoulder, chest wall and abdominal wall. In the case of large joints such as the knee and elbow, bandages are applied, with plaster above and below, in order that active exercises may be carried out. There are several advantages in the plaster technique. The dressing is comfortable and is held firmly in position. If evacuation of the patient is necessary, travelling in plaster is comfortable. In tropical and subtropical countries, where flies are numerous, the plaster forms a barrier against maggot infestation".

Raven's method has the great advantage that the even pressure helps to retain the plasma which is vital to the patient's existence. Cibazol powder or Cibazol ointment are also effective dressings for burns, but the routine administration of sulphonamides by the mouth is not advised.

Loss of plasma is made good by intravenous injection of plasma, 1,000 c.c. being the usual immediate dose in severe cases. If plasma is unobtainable we may attempt to restore balance by giving hypertonic glucose saline (2 drachms of salt and an ounce of glucose to a pint of water), but this is not nearly so good. Further, a high-protein diet, that is, plenty of eggs, milk and meat, should be given as soon and as liberally as possible. Reports on the intravenous or oral administration of amino acids are conflicting but if a protein hydrolysate, such as Aminoids (Arlington Chemical Co., N.Y., U.S.A.) is obtainable, it is given in full doses.

The methods described are the best for combating toxæmia because, by keeping the burnt area dry, they prevent absorption of toxins. In burns of the third degree, skin grafting must be done as soon as there are healthy granulations, otherwise there will be serious or even terrible contractures.

BURNS BY ACIDS AND CAUSTICS

There is very little shock from these injuries.

TREATMENT.—This consists in neutralizing the acid if possible, and treating the areas by one of the methods used for ordinary burns. Carbolic acid has a special danger as it may be followed by carboloria and nephritis. The carbolic acid should be washed off with spirit and the area then treated in the same way as for ordinary burns.

BURNS, ELECTRIC

The injury to the tissues is concentrated to the immediate surroundings of the entrance and exit of the current, but if the limbs are flexed burns are frequent at the flexures, the current being "shorted" from one surface to another. The skin usually comes off as a complete layer leaving the deeper tissues in a state of coagulation necrosis, and the toxæmic phenomena seen with ordinary burns are absent. Treatment is on general principles.

BURSAE, AFFECTIONS OF

Bursae may be acutely inflamed from injury or sepsis, or chronically inflamed from trauma, tubercle or syphilis. If recent, the condition may be treated by rest, removal of the cause of irritation, or the application of iodine or a blister, but if of any standing complete removal of the sac is the best treatment, but this may not always be an easy matter especially in some of the deeper bursae.

CAESAREAN SECTION—See Obstetrics.

CALCULI

Calculi always have an organic nucleus such as mucus or fibrin; they occur in ducts such as those of the biliary, digestive and urinary systems and also in the veins as phleboliths. They tend to occur in certain individuals, climates and diets and are usually associated with some stasis or concentration of the fluid passing along the ducts, or with a catarrhal inflammation of them. They cause pain in three ways; (1) by obstructing the fluid behind them and therefore causing distension of the secreting organ, (2) by causing inflammation of that organ, and (3) by moving in the duct containing them; in the last case the unstriated muscle is irritated and goes into a state of acute spasm in order to rid itself of the intruder, so the pain is both colicky and agonizing.

BILIARY CALCULI—See Cholecystitis.

PANCREATIC CALCULI.—These are composed of calcium carbonate or phosphate, are generally associated with, or may be the cause of, pancreatitis, and may cause severe colicky pain in the middle of the upper abdomen. Occasionally they attain large size and may press on the bile-duct causing jaundice. Treatment is by their removal when they are found at laparotomy. If large enough, they are visible on X-ray examination.

SALIVARY CALCULI.—These are composed of calcium carbonate or phosphate; they are generally small and are commonest in Wharton's duct from the submaxillary gland. The calculus can

often be felt under the tongue and is seen on X-ray examination. Calculi in Stenson's duct from the parotid are less common. Symptoms are characteristic; a slightly painful swelling of the gland before and at meal times. If the calculus can be felt it can often be massaged out, or the mucous membrane may be cocaineized and the duct stretched with a conical-shaped probe, or incised over the calculus. If the calculus is large or often recurrent, removal of the connected gland is the treatment. Large calculi are not uncommon in the submaxillary gland.

URINARY CALCULI.—These form in the kidney where they may remain, or they may be found anywhere between the renal epithelium and the urinary meatus. They are commoner in men than in women, which is odd, because men drink more than women. Lack of vitamin A is said to be a cause.

The following varieties occur:

In Acid Urine

- | | |
|-----------------------|--|
| Uric acid: | Common, smooth, soft, often multiple, may not show on X-ray examination. |
| Urate: | Similar to above. Slightly more visible on X-ray examination, common in children. |
| Oxalate: | Hard, sharp, show on X-ray picture, produce haematuria and pain. |
| Cystine and Xanthine: | Rare, show on X-ray examination. |
| Sulphonamide: | In intensive sulphonamide therapy when insufficient water is given sulphonamide crystals are deposited in the tubules. |

In Alkaline Urine

Phosphatic stone, nearly always associated with sepsis or suppuration, the phosphates being superimposed on an oxalic or urate nucleus.

A large stone may grow quietly for years, a small one draws attention to itself by getting jammed in the pelvis of the kidney or travelling into the ureter and causing renal colic.

RENAL AND URETERIC CALCULI.—

Diagnosis.—Pain in the back, associated with bouts of renal colic in which the pain passes down into the groin, is highly suggestive.

Haematuria occurs in about 70% of cases. A simple way of distinguishing right-sided renal colic from appendicitis is to give a big dose (gr. $\frac{1}{8}$) of atropine; this generally abolishes the pain of renal colic in 20 minutes but not that of appendicitis.

X-ray examination.—First a straight picture is taken which will show stones, if present. Next a pyelogram is taken, 5, 10 and 20 minutes after an intravenous injection of Pyelectan or a similar preparation. This shows the position of the stone, the state of the kidney and ureter, whether there is hydronephrosis, and whether the kidney is secreting urine.

Treatment of Renal or Ureteric stone.—Atropine therapy, accompanied by large (six to eight pints a day) quantities of fluid will

often get rid of a small mobile stone, but not if it has become fixed by cicatricial tissue. The fact that a patient has "renal" (generally ureteric) colic is often encouraging because it means that the stone is moving. Some of the newer synthetic antispasmodics, such as Syntropan, Trasentin or Propinan, have the advantage of being less toxic than atropine, so can be given in relatively larger therapeutic doses.

ACUTE RENAL COLIC.—Give atropine gr. $\frac{1}{8}$ with morphia gr. $\frac{1}{4}$ (if in doubt, omit the morphia). Put the patient to bed, give him a hot-water bottle, examine all urine for a stone, blood and pus, and have X-ray pictures taken—as described above—as soon as convenient.

STONE IN THE KIDNEY.—If the kidney is functioning, the stone should be removed through the pelvis of the kidney where possible, otherwise through the so-called bloodless (more correctly—"least bloody") line just behind the convex edge of the kidney; for small, unbranched stones, many surgeons prefer to make one or more small transverse incisions through the convexity of the kidney and to remove the stone or stones with forceps. A kidney which is not functioning should be removed. In such cases the intravenous pyelography mentioned above is absolutely essential; it not only shows the bad kidney, but the good one as well. The remark of the patient who said after a nephrectomy, "I feel much better than I did when my other kidney was removed", should no longer be possible.

STONES IN THE URETER.—Methods of diagnosis and medicinal treatment are as for renal calculus (see above). If the stone is small and smooth it will probably pass, but if it is rough and more than a centimetre in diameter it will not. About four weeks may be allowed for medical treatment, but if signs of anuria (see below) develop, operation is urgent. An X-ray picture should always be taken immediately before operation as the stone may have moved since the last one was taken. The usual sites of impaction are the ends of the ureter and the brim of the pelvis, where it crosses the iliac artery. An expert with the cystoscope can often remove by that means a calculus impacted the lower end of the ureter.

STONE IN THE BLADDER.—The symptoms are haematuria, frequency, pain after moving about, pain at the tip of the penis after micturition, and sometimes stoppage of urine. If a patient in Northern India says he (or his son) has a stone in the bladder he is generally right.

A bladder stone is generally of mixed composition and may attain a large size, the biggest the writer has seen being bigger than a cricket ball and weighing nine ounces.

Diagnosis is made by the bladder sound, with which an expert can form a good idea of the size of the stone. The cystoscope is more accurate but it is more difficult to pass, especially in a child. X-rays are very useful as they show the size of the stone.

Treatment is by litholapaxy if the stone has a diameter of less than one and a half inches in an adult and less than an inch in a child, whose urethra must take a No. 6 catheter; otherwise suprapubic lithotomy is done. The only occasion on which the old operation of lateral lithotomy is justified is in a small boy with a large stone and a septic bladder; in this case the bladder drains better and recovery is more certain than with the suprapubic operation.

URETHRAL CALCULUS.—This may be removed by special forceps, failing which it must be cut down on, the urethra being sutured over a catheter. The bladder must be drained suprapubically, otherwise the urine leaking past the catheter always infects the wound and causes it to break down. Chemotherapy helps healing.

CALCULUS ANURIA.—This occurs when a calculus suddenly blocks the outflow of urine from the only functioning kidney; whether the outflow from the normal kidney can become reflexly suppressed by sudden blockage of the other is doubtful, but it has long been supposed to be possible, so perhaps it is. Unlike patients with nephritic anuria who die of uraemia within 48 hours, these patients may survive as long as 10 or 14 days without passing a drop of urine.

Treatment is to dislodge or remove the stone by surgical means; if this is impossible, the pelvis of the kidney should be opened and drained through the loin. The intravenous administration of a pint of 4% sodium sulphate solution will start the secretion of urine which has become suppressed.

CANCER, INOPERABLE

Apart from treatment with radium and X-rays, much can be done by proper care not only to lessen the pain and distress, but even to prolong life.

GENERAL TREATMENT.—The diet should be an ordinary mixed diet with high vitamin content. Alcohol should not be withheld and will help to relieve pain and procure sleep. Tobacco, except in the case of growths of the lips, mouth and throat, should be allowed, but tea and coffee should be limited if there is much pain.

Constipation increases the restlessness and pain so the bowels should be kept regular. As long as the patient can move about he should be kept as much as possible in the open air with direct sunshine, when confined to bed he should be carefully nursed in a cheerful room. In most cases, as the disease advances, there is some anaemia and digestive disturbance for which one of the following tonics should be prescribed, but strychnine should not be given as it increases the sensibility to pain.

B. Ferri et Ann. Cit.	..	gr. 7 or B	Liq. Arsenic Hydrochlor.	℥ 4
Sod. Bicarb.	..	gr. 10	Acid. Hydrochlor. Dil.	℥ 12
Liq. Arsenicalis	..	℥ 4	Tr. Cinchonae Co.	℥ 25
Sp. Chloroform.	..	℥ 5	Aquam ad	3j
Inf. Calumbae ad	..	3j		
t.d.s.p.c.			l.d.s.p.c.	

RELIEF OF PAIN.—Pain varies considerably in different cases—in some the whole course is run with little or none, in others there is almost continuous agony. Every endeavour must be made to relieve this. If there is an ulcerated surface with exposed nerve endings, keep as clean as possible with antiseptic lotions. Cocaine is of little use, the effect passing off too soon. Orthoform in fine powder, phenol, guaiacol and subacetate of lead kept constantly applied as paints or lotions are more effective.

INTERNALLY.—Aspirin in 10 gr. doses will be effective at first, later phenacetin is most useful, and is the least toxic of the analgesic drugs, but amidopyrine and acetanilide may be tried. Sooner or later opium will be required and is best given by the mouth, the action being greater and more prolonged, while morphia is reserved for emergencies. *Liquor. Opii Sedativus* causes less digestive disturbance than *Tr. Opii*; as the case advances very large doses may be required. Alcohol is a valuable anodyne.

A symptom which causes much distress when swallowing is painful or difficult, is excessive secretion of saliva. This can be checked by *Tr. Belladonna* but it must be pushed in doses of 20 to 30 m.

HAEMORRHAGE.—Adrenaline is useless, as the vessels are thin walled without muscular coats. Try absolute rest with hot douches containing a styptic. If the bleeding point can be seen powdered dry *Ferri Sulph.* should be gently applied. Radium is a good preventive especially in cancer of the uterus and rectum.

REST.—The patient should have mental and physical rest, avoiding fatigue, and keeping the diseased part at rest as far as possible.

PALLIATIVE TREATMENT.—In cancer of the bladder, much relief follows the operation of presacral neurectomy; patients with cancer of the colon or rectum can be much helped by colostomy and those with cancer of the stomach kept alive a few extra weeks by jejunostomy; those with cancer of the prostate are greatly improved by injections of oestrogens. In some cases of cancer of the breast, local removal may make the patient more comfortable.

CARBON DIOXIDE SNOW

This very useful substance is easily made if one possesses a Sparklet apparatus or a cylinder of carbon dioxide, or can borrow one of the latter from a friendly soda-water manufacturer. Full instructions are issued with the Sparklet apparatus (which is far simpler than any other device) so need not be detailed here.

To make CO_2 snow without the Sparklet, proceed as follows:

- (a) Take a washleather bag about 4 inches by 5 inches or roll a piece of washleather or thick cloth two or three times round a finger or a desk ruler, so as to make a cylinder, folding one end over to make a sort of bag.
- (b) Invert the CO_2 cylinder so that the nozzle is the lowest point

(this is most important because the CO_2 in the cylinder is liquid).

- (c) Wrap the bag round the nozzle.
- (d) Open the tap sharply, so that a good rush of CO_2 takes place into and through the bag, and shut the tap.
- (e) Remove and open the bag. Its sides should be well coated with CO_2 snow.
- (f) Scrape some CO_2 snow off with a knife and mould into a short pencil having about the diameter of the lesion it is desired to treat. (The operator must wear gloves or manipulate the CO_2 with lint.)
- (g) Apply the CO_2 pencil firmly to the lesion, which should not be more than half an inch in diameter.

The following lesions are suitable; naevi (the red being easier to remove than the pigmented), warts and certain corns. About 40-60 seconds' application is usually sufficient, but a thin lesion may need only about half this time, whereas a thick wart or corn may need two or three minutes. A urethral caruncle (a frequently overlooked cause of dysuria or dyspareunia in women) may be successfully removed by about 30 seconds' application; it must first be cocaineized. Good results have also been reported from applying CO_2 snow for 10-20 seconds to irritating patches of eczema.

When the part thaws it soon becomes hyperaemic and a vesicle surmounted by the lesion forms within a few hours. After a few days a scab is formed, which separates, leaving no visible scar.

It is better to give too little than too much because the application can always be repeated, if necessary, for a longer period.

CARBUNCLE

GENERAL TREATMENT.—Test the urine for sugar and give insulin if it is present.

Give sulphathiazole or one of the other anti-staphylococcal sulphonamides. In severe cases, and in all cases between the bridge of the nose and the chin, give penicillin.

LOCAL TREATMENT (for facial carbuncle, see below).—

(1) Under intravenous, ethyl chloride or gas anaesthesia make a crucial incision through the carbuncle, undermine the carbuncle up to just beyond the edge, wipe away oozing pus and apply a dressing of 50% mag. sulph-glycerin paste.

(2) Another method is to withdraw 20-50 c.c. of the patient's blood and to inject it round and into the carbuncle. The blood should be citrated and the injections made at about six points round the carbuncle; the needle points to the centre of the carbuncle and is inserted slowly about $\frac{1}{2}$ inch outside the inflamed area, blood being injected all the while until it begins to escape from the cavernous carbuncle.

FACIAL CARBUNCLE.—Take an ordinary full-sized playing card, put one side on the tip of your nose and look in the mirror; the area covered is the dangerous area. It is called dangerous

because it is drained by the angular vein which runs down the side of the nose, but unfortunately communicates with the ophthalmic vein, which runs into the cavernous sinus. Further, the firm subcutaneous tissue of the face holds the veins open, so they are more liable to septic thrombosis than veins which can readily collapse. It is this combination of factors which is liable to carry facial sepsis to the inside of the skull and thus kill the patient.

Only two surgical procedures are permissible for carbuncles or even boils in this area; one is the injection of the patient's blood, as already described, the other is ligation of the angular vein at the side of the nose just below the eye on the affected side. Scraping, cutting and squeezing of the inflamed area are most dangerous because they may open up fresh channels to infection.

Penicillin must be given in full doses; at least one million units per 24 hours for several days give the best hope of recovery. Sulphonamides may also be given.

CARDIAC DISEASE—See Heart Disease.

CARIES, DENTAL—See Dental Surgery.

CATARACT—See Eye.

CATARRH, ACUTE NASAL

The common cold is often held up as a reproach to our otherwise fairly successful profession, but the treatment is improving and the French physician's remark, "The cold you don't treat lasts for a fortnight, and the cold you do treat lasts for fourteen days," is no longer strictly true.

A cold consists of two parts, a preliminary invasion, probably by a filter-passing organism which causes acute catarrh of the nasal mucous membrane lasting three to four days and a secondary infection by well-known micro-organisms such as the staphylococcus, streptococcus, influenza bacillus, *Mterococcus catarrhalis* and pneumococcus, which are present in most healthy noses but are kept under until the body's defences are weakened by the primary invader.

The best local treatment of a cold or any other nasopharyngeal catarrh is the inhalation of a snuff composed as follows:

R	Penicillin	..	..	100,000 units
	Sulphathiazole powder	:	..	gr. 30

This is snuffed up the nose several times a day and after every meal.

Colonel O'Meara advises that in the early stages a cold can be aborted by repeated and thorough irrigation of the nose with the following solution:

R	Sod. Chlorid	..	..	gr. 7
	Borax	..	..	gr. 2½
	Acid. Boric.	..	..	gr. 1
	Sodu Benzoat.	.	..	gr. ½
	Menthol.	..	..	gr. ⅛
	Thymol.	..	..	gr. ⅛
	Betacaine Hydrochlor.	..	..	gr. ½
	Ol. Gaultheriae	..	..	℥i ⅓

Ft. tablet (Tab Nasopharyngeal Co.)

To be dissolved in 1½ or 2 oz. of warm water.

streptomycin, tyrothricin, etc. The arsenicals and antimonials are considered under Venereal Diseases and Leishmaniasis respectively, so will not be further referred to here. Tyrothricin, prepared from cultures of the *Bacillus brevis*, has properties somewhat similar to those of penicillin, but it appears to be less effective and has not been developed to anything like the same extent, and the appearance of further chemotherapeutic agents is awaited with interest.

THE SULPHONAMIDES.—Sulphonamides in common use are sulphanilamide; sulphapyridine; sulphathiazole; sulphadiazine; Sulphamerazine; sulphaguanidine; Sulphasuxidine and Sulphamethazine.

There are certain differences in dosage, toxicity and suitability for various diseases. They are all made up in $7\frac{1}{2}$ -grain, i.e., $\frac{1}{2}$ -gramme, tablets, and many of them also in soluble form for intravenous injection in seriously ill or unconscious patients.

Dosage.—The initial dose should be high, 6–8 tablets, and the maintenance dose 2 tablets 4-hourly, except:

Sulphasuxidine:	Initial dose 16–20 tablets. Maintenance dose 6–8 tablets 4-hourly.
Sulphaguanidine:	Initial dose 8–14 tablets. Maintenance dose 6–8 tablets 4-hourly.
Sulphadiazine:	Maintenance dose 3 tablets 6-hourly.
Sulphamerazine:	Maintenance dose 2 tablets 8-hourly.

The writer's practice is to give the full dose for the first three or more days, according to progress, and then to halve the dose. Sulphonamides should not be given for less than five days except in trivial cases, otherwise the symptoms are apt to return.

In order to avoid crystallization of the sulphonamide salts in the kidneys, ample fluids must be given during their administration, and in order to avoid agranulocytosis no sulphonamide should be given for more than 10 successive days.

The degree of toxicity and liability to form renal crystals is as follows:

	TOXICITY	RENAL CRYSTALS
Sulphanilamide	Relatively high	Unlikely
Sulphapyridine	Ditto	Very likely
Sulphathiazole	Medium	Likely
Sulphadiazine	Low	Likely
Sulphamerazine	Low	Unlikely
Sulphasuxidine	Very low	Unlikely
Sulphaguanidine	Very low	Unlikely

The common toxic effects are nausea, epigastric pain, depression and cyanosis; alkalis improve the first two, alcohol the second, and methylene blue gr. 1–2 three times daily the last mentioned.

Hepatitis, skin eruptions, porphyrinuria, encephalitis, optic neuritis, anaemia and agranulocytosis are all recorded. In anaemic patients sulphonamides should always be given with caution after the first few doses.

The suitability for various diseases is more or less as follows:

DISEASE	FIRST CHOICE	SECOND CHOICE
Abortus Fever	Sulphamerazine	Sulphathiazole
Actinomycosis	Sulphathiazole	Sulphadiazine
Chancroid	Sulphathiazole	Sulphanilamide
Cholera	Sulphaguanidine	Sulphasuxidine
<i>B. coli</i> infections	Sulphamezathine	Sulphanilamide
Conjunctivitis	Sulphathiazole	Sulphadiazine
(for local application)	Atbucid	
Cystitis (<i>B. coli</i>)	Sulphathiazole	Sulphanilamide
Dysentery, bacillary	Sulphaguanidine	Sulphadiazine
Dysentery, Sonne bacillus	Sulphasuxidine	Sulphaguanidine
Gonococcal infections	Sulphathiazole	Sulphadiazine
Lymphogranuloma inguinale	Sulphathiazole	Sulphadiazine
Malta fever	Sulphamerazine	Sulphathiazole
Meningitis (all forms)	Sulphadiazine	Sulphathiazole
Plague	Sulphadiazine	Sulphathiazole
Pneumonia and Friedlander's pneumonia	Sulphadiazine	Sulphathiazole
Staphylococcal infection	Sulphathiazole	Sulphamerazine
Streptococcal infection	Sulphamerazine	Sulphadiazine
Tularaemia	Sulphathiazole	Sulphadiazine

PENICILLIN.—

Intramuscular.—This is the usual method of administration, and the usual dose is 100,000–200,000 units in 24 hours or about 10,000–20,000 units per stone of body weight, injections being given intramuscularly every three hours day and night. The drug is made up with normal saline or distilled water so that each injection is $\frac{1}{2}$ –1 c.c. It is rapidly excreted by the kidneys, and research is being carried out on methods of retarding absorption, one being to give it in a mixture of arachis (pea-nut) oil and beeswax, but the results so far recorded do not appear to be much better than those of a single large injection in a small quantity of water. Dosage is extremely variable; for instance, in gonorrhoea a single dose of 200,000 units generally cures the disease, but in infective endocarditis it may be necessary to give a million units (one mega unit) or more daily for six weeks or longer. As the drug is non-toxic the tendency is to give larger doses, especially at the beginning.

The continuous intravenous drip is occasionally used but in most cases has no therapeutic advantage over the intramuscular method.

Topical Application.—In general, calcium penicillin is preferred to the sodium salt for this purpose; weak solutions, e.g., 500–1,000 units per c.c., are used for wounds and rather stronger ones for septic cavities. For eye drops the optimal strength is 2,500–3,000 units per c.c. and for subconjunctival injection 500–1,000 units per c.c., but crystalline penicillin can be used in much greater strength. Septic mouth conditions and Vincent's Angina are successfully treated by direct application.

An ointment with considerable penetrating power is made by Messrs. Squibb & Co. with about 1,000 units per c.c. in a base of beeswax, arachis oil, Vaseline and anhydrous lanoline. As it is in a water-free base the penicillin retains its efficacy for a long time.

A mixture of penicillin with sulphathiazole powder in the proportion of 100,000 units to 2-10 grammes (30-150 grains) is an excellent dressing for wounds, cuts and burns, or the powder mixture may be incorporated in an ointment in a strength of 10 per cent.

Penicillin by the Mouth.—When taken by the mouth on an empty stomach one-third of the penicillin appears to be absorbed; in other words the oral dose is three times that of the intramuscular or intravenous.

Serum concentration is maximal in about half an hour, half that at the end of the first hour, and falls to zero at the end of four hours. The oral route is particularly effective in infants.

Important points are:

The penicillin must be given on an empty stomach, so only light food is allowed and then not within two hours.

As penicillin is adversely affected by acid, it should be buffered with an alkali such as sodium bicarbonate, sodium citrate or trisodium citrate. It appears to be absorbed in the upper part of the small intestine, so keratin-coated capsules are not recommended.

Although three times as much of the drug is required, oral penicillin is cheaper for the patient in other ways because it saves nursing expenses. It is also more comfortable for the patient, but results are less uniformly successful than those of the injection method.

Much of the trouble, such as irritation, reactions and variability associated with the earlier preparations of penicillin was due to impurities, samples varying greatly in the amount of pure penicillin they contained. Pure penicillin is now obtainable as a colourless, relatively stable powder, each milligramme of which contains 1,660 Oxford units. As with the older forms, the sodium or calcium salt is used.

THE FOLLOWING ARE SENSITIVE TO PENICILLIN

- Actinomycosis (*Streptothrix actinomyces*).
- Anthrax (*Bacillus anthracis*).
- Botulism (*Bacillus botulinus*).
- Diphtheria (Klebs-Loeffler *Bacillus*; modern name *Corynebacterium diphtheriae* Serum also needed).
- Erysipelas (*Streptococcus haemolyticus*, *Erysipelothrix rhusiopathiae*).
- Gas Gangrene (*Clostridium perfringens welchii*; *Clostridium septicum*).
- Gonorrhoea (*Gonococcus*; modern name *Neisseria gonorrhoeae*).
- Meningitis (*Meningococcus*; modern name *Neisseria intracellularis*).
- Ornithosis (*Virus*).
- Pneumonia (*Pneumococcus*, *Diplococcus pneumoniae*).
- Psittacosis (*Virus*).
- Rat-Bite Fever (*Spirillum minus*).
- Relapsing Fever (*Spirochaeta recurrentis obermeieri*; modern name *Borrelia navyi*).
- Spirochaetal Jaundice (*Leptospira icterohaemorrhagiae*).
- Staphylococcus infection (*Staphylococcus aureus*, but not all strains of *Staph. albus*).
- Streptococcal infection (*Streptococcus haemolyticus*, *Str. pyogenes*, *Str. salivarius*, anaerobic, macro-aerophylic. Not all strains of *Str. viridans*,

although some succumb to prolonged penicillin treatment, not *Streptococcus faecalis*.
 Syphilis (*Treponema pallidum*)
 Tetanus (*Clostridium tetani*. Serum also needed).
 Vincent's Angina (Vincent's spirillum and bacillus).
 Yaws.

THE FOLLOWING ARE NOT SUSCEPTIBLE TO PENICILLIN

Acne Vulgaris	<i>Onidium albicans</i> infection
Blastomycosis	Pemphigus (unless streptococcal or syphilitic)
<i>Brucella abortus</i>	Plague
Chaneroid	Polio-myelitis and polio-encephalitis
Chicken-pox	Pyocyanus bacillus infections
Cholera	Primary atypical pneumonia
Coccidiosis (California disease)	Proteus bacillus infections
Colon bacillus infections	Rheumatic fever
Dysentery group	Rheumatoid arthritis
Encephalitis lethargica	Smallpox virus (but very useful in preventing septic complications)
Enteric group	Sporotrichosis
Friedländer's bacillary pneumonia	<i>Streptococcus faecalis</i> infection or septicaemia
Granuloma inguinale	Torulosis
Herpes zoster	<i>Trichomonas vaginalis</i> infection
Influenza	Tuberculosis
Kala-azar	Virus diseases in general, except those due to large viruses, such as ornithosis and psittacosis
Leukaemia	
Lupus erythematosus	
Malaria	
Malta fever	
Mumps	
Myositis	

Tyrothricin, derived from cultures of the *Bacillus brevis*, is a mixture of gramicidin and tyrocidine. It appears to be more useful as a local application than when given by injection owing to the fact that the latter causes haemolysis. It has been used with success against Gram-positive bacteria and various pyogenic cocci. It is far more stable than penicillin either in powder form or in solution.

Streptomycin, produced from a variety of actinomyces, has properties somewhat similar to those of penicillin but its field of usefulness is not so wide. Weight for weight, penicillin is 200 times more active, but although streptomycin does not affect certain diseases cured by penicillin, it appears to be effective against some Gram-negative bacilli, such as *B. coli*, *H. influenzae*, *B. proteus* and possibly *B. pertussis*. Among the Gram-positive organisms it is effective against the *Streptococcus faecalis*. Against typhoid fever and tuberculosis the drug has so far proved disappointing. It is retained in the body for longer than penicillin, but diseases are apt to recur as soon as it is stopped. It is more toxic than penicillin; toxic symptoms include "damage to the vestibular portion of the eighth nerve, causing deafness, tinnitus and related vestibular symptoms and resulting in an ataxia which is usually compensated for after several weeks" (Squibb Memoranda).

CHICKEN-POX

Treatment is on general lines, but it is important to prevent the lesions from becoming septic. With this object a daily bath of boric

acid (one ounce to the gallon) or pale-pink permanganate lotion may be given. Itching may be relieved by calamine lotion or carbolyzed oil, and a tendency to scratch by putting the patient's hands in gloves or bandaging them.

CHILBLAINS

These occur in the colder parts of Northern India. General treatment is to avoid cold, to take calcium, vitamin D and sometimes Parathormone, and not to warm the fingers or toes quickly after they have been subjected to cold. Local treatment is by Ichthyol ointment or methylated spirit in order to allay the itching.

CHLOROSIS—See Anaemia.

CHOLECYSTITIS

ACUTE.—The common cause is impaction of a gall-stone in the cystic duct. The gall-bladder is distended, tense and tender; it would also be palpable on deep inspiration if the overlying muscles were not rigid. The condition has to be distinguished from a perforated peptic ulcer and a high-lying acute appendix. If there is doubt, it is better to open the abdomen. The occasional operator is advised to drain the gall-bladder; the expert needs no advice.

If the diagnosis is clear, there is no hurry to operate and Ochsner-Sherren treatment as detailed under "Appendicitis" is carried out. The local application of heat is comforting and a sedative may be given, but not morphia as this might mask untoward symptoms; under the Ochsner-Sherren regime perforation of the gall-bladder is practically unknown, but when it occurs the patient is generally over 50 years of age. The gall-bladder should be removed two or three weeks later. If, in spite of treatment, symptoms remain acute after 48 hours, the gall-bladder should be drained; it can be removed later.

CHRONIC.—When a person over 45 has a sudden attack of abdominal pain with vomiting, think of coronary thrombosis; if there are repeated attacks, think of gall-stones.

Chronic cholecystitis is invariably associated with gall-stones, but not with jaundice unless a stone gets jammed in the common bile-duct.

The function of the gall-bladder and the presence or absence of stone is beautifully shown by X-rays (see X-rays).

The best clinical signs are tenderness over the gall-bladder area and Naunyn's sign, which is elicited as follows: the surgeon presses deeply over the gall-bladder area and tells the patient to take a deep breath; if there is cholecystitis the patient stops inspiring quite sharply as soon as the gall-bladder reaches the area being pressed on by the surgeon.

CHOLERA

The objects of treatment are to destroy the vibrios, to prevent loss of fluid by the bowels, to replace that which is lost, to relieve

cramps and spasms, to combat toxæmia and to re-establish the secretion of urine when it has become suppressed. Since the last edition of this book was written, the sulphonamides have come on the scene and although the treatment of cholera has not been revolutionized it has been greatly improved by the use of sulphaguanidine in full doses; the Calcutta authorities report a decrease in the death rate from 5% to 1%. Most of us who work in districts would consider a 5% mortality exceptionally good, 30% to 40% being more usual in an epidemic where skilled nursing and attendance are quite impossible; so if sulphaguanidine can cut the rural mortality in the same proportion, its benefit will be very great. Rogers's hypertonic saline is still the basis of treatment, but sulphaguanidine has replaced potassium permanganate and the essential-oils mixture, and it has been found beneficial to give half to one pint of serum or plasma intravenously in addition to the saline.

ROGERS'S INTRAVENOUS ALKALINE HYPERTONIC SALINE TREATMENT.—

Two solutions are required, both, of course, sterile.

Solution A

Salt	.. ..	120 grains (two teaspoonfuls)
Calcium chloride	.. ..	4 grains
Distilled water	.. ..	1 pint

Solution B

Salt	.. ..	90 grains
Sterile bicarbonate of soda	.. ..	160 grains
Distilled water	.. ..	1 pint

The solution is boiled and cooled before the bicarbonate is added. The water should be distilled and pyrogen-free if possible (*see* under Anaphylaxis), but the injection should never be withheld for lack of these refinements, and boiled tap water is far better than nothing.

In the early stages, give two parts of A to one of B, but if the patient appears "acidotic" make the proportions equal or reverse them.

QUANTITY.—Have six bottles of glycerin and water of specific gravity 1054, 1056, 1058, 1060, 1062 and 1064 (made up with the help of a urinometer). Pour a little of each into six small vessels; put in a drop of the patient's blood; if it sinks it is of lower specific gravity and if it floats it is of higher specific gravity—the specific gravity of the blood is between that which sinks and that which floats. Rogers's rule is to give one pint of solution for every unit above 1060, i.e., one pint when the specific gravity of the blood is 1061, two when it is 1062, and so on, but more than three pints should never be given at one time.

Two other observations should be made, the blood-pressure and the rectal temperature. If the blood-pressure is below 80 systolic, at least $1\frac{1}{2}$ pints must be given, and it is desirable to raise the pressure to 100.

If the rectal temperature is high, the saline must be cool; Rogers

In performing the operation it is important to remove a sufficiency of both layers of the prepuce, but sufficient should be left so that the corona glandis is covered when the wound is healed. In adults the operation can be done under local anaesthesia. It is important to remember that a pinhole meatus is frequently associated with phimosis and should be treated at the same time.

CIRRHOSIS OF THE LIVER

If the patient comes for treatment in the early stages when the symptoms are those of gastric catarrh and hepatic congestion, the best treatment is rest in bed with peptonized milk 3 or 4 pints daily for so long as the patient can tolerate it; three months if possible. Followed by a milk diet for another 3 to 6 months if the patient will submit, the result is remarkably good. Alcohol is, of course, absolutely prohibited in any form, and the patient should always avoid spiced or irritating food. Unfortunately the majority of patients come under treatment when the serious symptoms of haematemesis or ascites have developed. Haematemesis may be very profuse; it usually stops spontaneously, but may require adrenaline 1 in 1,000 10-30 m in a drachm of iced water every 2 hours, or calcium chloride 1 gr. in 3ij water, or Haemoplastin 1 c.c. intravenously. Even after haematemesis I have known cases live for ten years and lead useful lives if there is a complete cessation of alcohol. As regards ascites if this is not due to simple, chronic or tuberculous peritonitis, the patient will not live longer than two to three months. Oedema of the feet is another grave event (Hale-White). Alcoholic cirrhosis in patients under forty is accompanied by tuberculosis either of the lungs or peritoneum in two-thirds of the number of cases. The following prescriptions have proved useful in some cases:

E. Amm. Chlorid. . . . .	.. gr. 12 or	E. Oleum Copaibae . . . . .	.. m 12
Liq. Ext. Taraxaci . . . .	.. ʒi	Mucilag. Acaciae . . . .	.. ʒi
Tr. Apocyanu . . . . .	.. ʒss	Syrup. Tolu. . . . .	.. ʒj
Syrup. Aurantu . . . . .	.. ʒss	Aqua. Cinnam ad . . . .	.. ʒj
Inf. Sennae Co. ad . . . .	.. ʒj		
Twice daily.		Pulv. Jalapae Co. . . . .	.. gr. 15
		Pot. Tart. Acid. . . . .	.. gr. 30

Novasurol—This is still on trial.

For one powder.

The Talma-Monson operation, by which an attempt is made to increase the collateral circulation between the portal and systemic venous systems, has been tried in some cases, but when the ascites is due to a general toxæmia, the result of failure of liver function, the condition is terminal for which no treatment is availing.

CISTERNAL PUNCTURE

The patient's head is flexed and the needle inserted in the midline exactly on a level with the tips of the mastoid processes; the point is aimed at the bridge of the nose and the cistern is entered at a depth of two inches (5 c.ms.) from the skin; the stilette should be withdrawn from the needle as soon as the tough occipito-atlantoid ligament is pierced and the needle gently pushed in until fluid comes out; if it is pushed in too far the medulla may be punctured, with a

fatal consequence. The exact depth at which the cistern lies is two centimetres behind the tips of the mastoid processes.

CLIMACTERIC—See Gynaecology.

CLIMATIC TREATMENT—See Hill Stations and Health Resorts.

COCAINE HABIT—See Mental Diseases (Drug Addiction).

COCCYGODYNIA

This sometimes follows labour or injury such as a fall from a horse; the coccyx is tender on pressure, so the patient often carries an air ring to sit upon.

TREATMENT.—If sedatives, treatment of constipation, rest and removal of a septic focus fail, the injection of saline into the sacral canal as described under "Sciatica" may succeed. X-ray pictures of the coccyx should be taken, and if any abnormality is found, the bone should be removed; in many cases removal of the coccyx may cure the disease, but not always. The writer once involuntarily cured a case of coccygodynia by removing the patient's appendix.

COELIAC DISEASE (See also Sprue.)

This is a chronic intestinal disturbance in children over a year old; the motions are large, pale and offensive. There is wasting and arrest of growth. These children do not tolerate fat or carbohydrates. Diet is of the first importance and should consist largely of raw, fresh meat juice. A child of two years can take 6 ozs. daily. Vitamins are also very important. Folic acid 10-20 mg. daily may be given.

Vitamin D should be given as irradiated ergosterol, by injection if necessary, as there may be deficient absorption from the gut. The other vitamins must also be given liberally. Diet is important, and no fats should be allowed, skimmed milk being used instead of ordinary milk. Sugar, green vegetables, fruit and fluids form the bulk of the diet, but bread, fish and lean meat may be taken as well.

COLD IN THE HEAD—See Catarrh, Acute Nasal.

COLIC

BILIARY COLIC.—

- (1) Morphia tartrate gr. $\frac{1}{4}$ with atropine sulphate gr. $\frac{1}{100}$ and a hot bath.
- (2) Stop all food and give water only by mouth.
- (3) After six hours give a bismuth, hydrocyanic acid and morphia mixture.
- (4) If there is much tympanites give a turpentine enema and apply turpentine stupes to the epigastrium.
- (5) After the acute attack is over give:

R. Sod. Salicylat.	..	..	..	gr. 8
Ext. Belladonnae	..	..	..	gr. $\frac{1}{4}$
Dissolved in hot water i.d.s.				

No drug can cure or remove gall-stones, the constant irritation from which often results in carcinoma; operation should always be advised. The Mayo Brothers have published numerous statistics showing that gall-stones once removed do not recur.

COLIC IN CHILDREN

TREATMENT OF THE ATTACK.—Hot fomentations to the abdomen or, in severe cases, the mustard bath, and dill water as a carminative. To prevent recurrence in bottle-fed babies, see that the bottles are clean and that the child is getting a suitable milk mixture. See Artificial Feeding of Children.

IF THE CHILD IS BREAST-FED.—It is probably getting too large a feed and at irregular intervals. Nothing is so important as the absolutely regular feeding of infants. In both bottle-fed and breast-fed children, treat constipation, if present, and give the following mixture between feeds:

R. Sodii Bicarb. . . . .	..	..	..	gr. 2
Tr. Rhet. Co. . . . .	..	..	..	℥ 2½
Sp. Amm. Aromat. . . . .	..	..	..	℥ 2
Aquam Anethi . . . . .	..	..	..	℥ 3f

Flatulent Colic

R. Ol. Terebinthinae . . . . .	..	..	..	℥ 4
Liq. Ext. Liquorice . . . . .	..	..	..	℥ 10
Spt. Ether Nut. . . . .	..	..	..	℥ 20
Codeinae . . . . .	..	..	..	gr. 1
Mist. Amygdalae ad . . . . .	..	..	..	℥ 3½

L.d.s. for a child of 7 or 8 years.

INTESTINAL COLIC.—Apply hot bottles or hot turpentine stupes to the abdomen. In all severe cases it is safer to empty the bowel by an enema; this should be large—1 or 2 pints of soap and water to which is added 1½ ozs. of castor oil or if there is much flatulent distension ½ oz. of oil of turpentine.

A useful aperient draught for colic is:

R. Oleum Ricini . . . . .	..	..	..	℥ vi
Tr. Rhet. . . . .	..	..	..	℥ 30
Tr. Opu . . . . .	..	..	..	℥ 10
Aquam Menth. Pip. ad . . . . .	..	..	..	℥ 30

The pain may be so intense that a hypodermic injection of morphia with atropine may be necessary.

Belladonna is valuable in intestinal spasm especially of the colon and may be combined with a carminative mixture such as the following after the bowels have been open:

R. Tr. Belladonn . . . . .	..	..	..	℥ ss
Tr. Cardamon. Co . . . . .	..	..	..	℥ 10
Sp. Ammoniae Aromat. . . . .	..	..	..	℥ ss
Sp. Chloroforma . . . . .	..	..	..	℥ ss
Sod. Bicarb. . . . .	..	..	..	℥ f
Aquam ad . . . . .	..	..	..	℥ vi

An ounce every two hours.

Lead Colic

R Mag. Sulph.	℥ij	R Pulv. Opū	gr. 12
Acid. Sulph. Dil.	℥j	Ext. Belladonn.	gr. 2
Aquae	℥iv	Olei Tigli	℥ 12
One teaspoonful t.d.s.		Make 12 pills. One pill every 2	
Precede by 10 gr. Pot. Iodide.		hours until relieved.	

The subcutaneous injection of a pint of saline, under the skin of the abdomen, has been of great benefit in some cases. *See also* Plumbism.

RENAL COLIC—*See* Calculi.

COLITIS

This may be ulcerative or muco-membranous, and the first named may be acute or chronic.

As dysentery is immensely more common in India than non-dysenteric colitis, it must be rigidly excluded before the latter is diagnosed; sprue and salmonella infections must also be excluded.

- The stools are examined carefully and if need be repeatedly.
- A sigmoidoscopy is performed.
- Anti-dysenteric treatment is given; it will often be found that a combination of emetine and sulphaguanidine, followed by a course of Carbarsone or Stovarsol, produces marked improvement. In the ulcerative type, penicillin, given as described under Amoebiasis, should always be tried if other measures fail. (*See also* Dysentery.)

Acute ulcerative colitis is treated on the same lines as dysentery, but if it turns into the chronic variety and the measures already advocated fail, other means must be tried, the most successful being daily bowel washes with 1:1,000 silver nitrate, following an alkaline wash-out. If the condition is still resistant, appendicostomy may be done and the bowel washed out from above. Removal of the colon is not advised, but a high colostomy has sometimes been performed in order to give rest and cleanliness to the bowel below. Occasionally, syphilis affects the colon.

MUCO-MEMBRANOUS COLITIS.—

This is a disease of constipated, debilitated, middle-aged women and has been variously considered as a neurosis, an infection, an allergic condition, an avitaminosis or the result of the laxative habit, and treated correspondingly.

It is characterized by the passage of muco-membranous casts, which often more or less coat the constipated stools. The colon is generally thickened and often tender.

Treatment of the neurosis comprises psychotherapy, bromides and Oestroform. Constipation is helped by liquid paraffin and bowel washes. Diet should be soft and non-residue forming, eggs, meat, milk and sugar being allowed and coarse food with much residue forbidden.

Hyoscyamus and belladonna are useful for the colicky spasms, e.g. (Lockhart-Mummery):

R. Tinct. Hyoscyami	℥ 30
Tinct. Belladonnae	℥ 6
Sod. Bicarb.	℥ 20
Tinct. Zingiberis	℥ 15
Spirit. Chloroformi	℥ 20
Aq. Menth. Pip. ad	℥ 3j

i.d.s.

COLLAPSE AND FAINTING

Keep the patient's head low; if he—or, more generally, she—is sitting, put the head between his knees. If the patient is on the ground, leave him there and raise the legs. Loosen tight clothing and give fresh air.

Effective remedies are sal volatile, nest spirits and smelling salts.

COLON, CARCINOMA OF

If detected and operated on at an early stage the results are excellent as cancer of the pelvic colon is often of a very favourable character as regards its malignancy; invasion of the surrounding structures being slow, and there is no great tendency to recur. Therefore, all patients with symptoms that might point to carcinoma of the colon should be carefully examined with X-rays and a barium enema, and the sigmoidoscope. Diverticulitis may closely simulate cancer.

COMA

CAUSES.—

1. *Injuries to the Head.*

2. *Cerebral Lesions:*

- | | |
|---------------------------|---|
| (1) Cerebral Haemorrhage. | (5) Cerebral Abscess. |
| (2) Cerebral Embolism. | (6) Cerebral Syphilis. |
| (3) Cerebral Thrombosis. | (7) Meningitis. |
| (4) Cerebral Tumour. | (8) Thrombosis of the Cerebral Sinuses. |

3. *Other Lesions of the Nervous System:*

- | | |
|--------------------------------------|-------------------------|
| (1) Epilepsy. | (3) Multiple Sclerosis. |
| (2) General Paralysis of the Insane. | |

4. *Toxic:*

- | | |
|---------------|--|
| (1) Uraemia. | (3) Alcohol. |
| (2) Diabetes. | (4) Narcotic poisoning, such as opium, carbolic acid, etc. |

5. *General Diseases:*

- | | |
|---------------------------|------------------------------|
| (1) Cerebral Malaria. | (3) Ulcerative Endocarditis. |
| (2) Acute Yellow Atrophy. | (4) Typhoid. |

6. *Heat-stroke and Exposure to Extreme Cold.*

7. *From great Muscular Exertion.*

For treatment refer to each condition.

COMEDONES—*See* Acne and Pimples.

COMPRESSION, CEREBRAL—*See* Head Injuries.

COMPOUND FRACTURES—*See* Fractures.

CONCUSSION, CEREBRAL—*See* Head Injuries.

CONDYLOMATA OF ANUS—*See* Anus.

CONGENITAL DISLOCATION OF THE HIP

As a rule the condition is not suspected until the child begins to stand and walk. Up to six years in unilateral and five years in bilateral, treatment by manipulation may give excellent results. After this time it will be necessary for the muscles to be stretched before reduction, the limb being put up in plaster of Paris.

CONGENITAL PYLORIC HYPERTROPHY

The patient is generally a boy about three weeks old, and often the first child. The usual history is that he did well for the first week or two and then began bringing up his feeds; sometimes changes of food have been tried, which seemed to suit the patient for two or three days, after which the vomiting began again. Occasionally, the trouble begins in the first or second week, but very seldom after the sixth. Constipation is constant.

DIAGNOSIS.—The child is examined while it is having a feed, when three things are observed: (a) waves of peristalsis are seen passing across the stomach from left to right, trying to force the food through the pylorus; (b) if the surgeon's fingers, which must be warm, gently palpate the child's epigastrium, a lump about the size of an ordinary grape will be felt, sometimes up under the liver, to the right of the midline; (c) after a while the child vomits and the waves of peristalsis may—or may not—he seen going from right to left. The characteristic of the vomiting is its projectile character, the feed being shot out of the mouth with some force.

TREATMENT.—It is better to operate too early than too late, and surgical treatment must never be delayed until the child has become starved and dehydrated. Children under four weeks generally require operation.

Medical treatment

- (a) Give Eumydrin (atropine methylate) 3–5 c.c. of a freshly made 1:10,000 solution half an hour before each feed. This may cure the trouble if it is not very severe. Syntropan, Trasentin and Propiagan are used similarly, in accordance with the dosage on the packet. If none of these preparations is available, Tinct. Belladonnae, half to one minim in half a teaspoonful of water may be given half an hour before each feed, and continuously increased, but as the "relaxation dose"

aloës, cascara and senna; they have the advantage that they do not act until they reach the large bowel, so if they are taken at night they take effect in the morning.

The following bed-time pills are effective:

R Dry Extract of Aloës	
" " Hyoscyamus	
" " Nux Vomica	
" " Thyroid.	A quarter of a grain of each.
R Calomel	
Podophyllin Resin	
Extract of Belladonna	
" Nux Vomica,	A quarter of a grain of each.
R Phenolphthalein	
Dry Extract of Cascara,	Two grains of each.

Calsalettes (Torbet Lactic Oat Co., Edinburgh) are a favourite prescription of the writer's, the dose being one or more at bedtime; other good laxatives are Taxol, Cascara Evacuanti, Lixen, etc. Senna pods suit many people, the usual number being six to ten; they may be allowed to soak in cold water all day and drunk at night or made with boiling water at night and taken after soaking for 10 minutes; the latter method is more likely to cause griping.

CONSTIPATION IN CHILDREN

This is a most important condition. Habitual constipation in the adult is often the result of bad habits formed at school, the child not taking, or not being given, sufficient time for the daily opening of the bowels. The bowels can be taught to act daily at any given time, and this habit should be encouraged in every child. An efficient child's nurse will so train an infant that, after the early months, the napkins are seldom soiled.

In treatment, do not give purgatives to the mother with the idea that an aperient effect will be conveyed to the child by the mother's milk, as this method is useless. Absolutely forbid the use in the nursery of enemas and suppositories of any kind. Avoid severe purgatives, as the subsequent constipation is always more difficult to treat. Massage along the line of the colon is most useful. If drugs are necessary, try Syrup. Senna, Pulv. Glycyrrh. Co. or aloës at bed-time. The following prescriptions are recommended by Hutchison:

<i>Constipation in Bottle-fed Babies</i>	<i>Constipation in Breast-fed Babies</i>
R Soda Phosphate, 5 to 10 gr. added to each feed.	R Fluid Magnesia 3j-iv
R Sulphur, 1 gr.	
<i>Constipation in Older Children</i>	
R Confection Sulphur, half-teaspoonful, if motions are hard, and passed with difficulty and tenesmus.	R Sod. Sulph. 3j
	Tr. Aloes R 15
	Syrup. Sennae 3ss
R Tr. Podophyllin, 1 to 2 fl. when motions are white, chalky, and friable.	R Pulv. Rhei gr. 5 to 10
	Hydrag. cum Creta gr. 1 or more.

Chronic Constipation

R. Tr. Aloes	℥ 3 to 5
Sod. Sulph.	gr. 10
Tr. Belladonnae	℥ 1
Syrup. Ginger (or Syrup. Sennae) .	℥ 20
Aquam Menth. Pip. ad .. .	℥ j

Costiveness may result from dryness of the stools from too little fluid being taken, therefore plain water or barley water should be taken between meals. Once a mild catarrh of the bowel is set up for any cause the faecal masses are covered with slime and the bowel contractions slip over them without being effective in expulsion.

Unsuspected hypothyroidism is occasionally the cause of chronic constipation, especially in children.

CONTRACTED PELVIS—See Obstetrics.

CONVULSIONS, INFANTILE

The causes of convulsions are:

1. *Epilepsy*:

10 per cent. of cases of epilepsy begin as convulsions in infants. (*Gowers*.)

2. *Toxic*:

(a) The onset of specific fevers, taking the place of the rigor in the adult.

(b) Malaria.

(c) Uraemia.

3. *Reflex Irritation*:

Gastro-intestinal—food or worms. Colic.

4. *Gross Lesions of the Brain*:

(a) Meningitis—various forms.

(b) Cerebral haemorrhage, tumour, abscess, syphilis.

(c) Infantile hemiplegia.

5. *Diseases of the Nervous System and Heat-Stroke*.

TREATMENT.—The immediate treatment is the same, no matter what the cause. Place the child in a hot bath, with or without mustard, and give chloral, gr. 3, per rectum, in a child under 6 months; if the convulsions are severe and continue, give a few whiffs of chloroform or an inhalation of amyl nitrite. Emetics are never advisable.

TO PREVENT RECURRENCE.—Careful attention to feeding; if sedatives are required, chloral is the best, and is more efficient than bromides, or the two may be combined:

R. Chloral. Hydras.	gr. 1½
Sod. Bromidi	gr. 2½
Syrup.	℥ 20
Aquam ad	℥ j

Reflex causes of irritation such as rickets, nasopharyngeal obstruction, worms, phimosis, eye and ear trouble should be attended to.

CORNEAL ULCER—See Eye.

and a crowing inspiration takes place. Treatment of the attack is to throw cold water in the child's face; further attacks may be prevented by such a mixture as:

R. Chloral. Hydrat.	gr. 1½	} or more according to age
Sod. Bromid.	..	..	..	..	gr. 3
Tinct. Belladonnæ	..	..	..	..	℥ 1
Syrup. Simpl. ad	..	..	..	..	℥j

Injectations of calcium should also be given, and it is essential to treat the causative rickets.

LARYNGITIS STRIDULOSA.—This is a form of night terror and occurs in nervous children between the ages of 3 and 8 years, usually when they are ill from some such cause as bronchitis or a common cold. Sometimes the child has an asthmatic tendency, sometimes it is constipated, sometimes it has enlarged tonsils or adenoids, and very often it has had a large meal before going to bed.

Treatment.—The attack is best combated by hot applications to the neck and comforting words to the ear. Prevention consists in treating the cause, if it can be discovered, and the administration of some soothing remedy at bedtime, such as Gardenal $\frac{1}{4}$ – $\frac{1}{2}$ grain, or a chloral, bromide and belladonna mixture.

CATARRHAL LARYNGITIS.—This is usually secondary to inflammation or catarrh of the nasopharynx. Treatment is by steam-cum-Tinct. Benzoin. Co. inhalations, and the administration of sulphonamides, or in severe cases, of penicillin.

DIPHTHERITIC LARYNGITIS.—This is suspected if the child is obviously ill, if membrane can be seen in the pharynx or if there is a bloody discharge from the nose.

Treatment.—Give 20,000 units of diphtheria antitoxin as soon as real suspicion arises. Swabs are then taken and further treatment carried out as for diphtheria. If the condition is serious, tracheotomy may be required. Other causes of croup are early whooping-cough, foreign body, papilloma of the larynx (not very uncommon), congenital syphilis, trauma from hot or irritating gas, as from sucking the spout of a steam kettle, enlarged thymus gland, retro-pharyngeal abscess, tuberculous mediastinal glands and, occasionally, laryngeal tuberculosis.

CRYPTORCHISM.—See Testicle, Undescended.

CUPPING

Cupping is used for the relief of inflammation by drawing blood away from the inflamed area. There are two kinds:

(1) **DRY CUPPING.**—In this the blood is only drawn to the surface, acting as a counter-irritant.

(2) **WET CUPPING.**—The blood is drawn from the body, acting as a counter-irritant and depletant.

The skin is washed and dried before application.

DRY CUPPING.—The edge of a small thick glass is smeared with Vaseline, a small piece of blotting paper soaked in methylated

spirit is lighted inside the glass, which is then inverted, and firmly placed over the part to be cupped. On account of a partial vacuum being formed, the soft tissues are drawn into the glass and become deeply congested. To remove the glass, press the finger under the edge, when the air rushes in.

WET CUPPING.—This is done in exactly the same way, except that the skin is scarified just before the cup is applied. As much blood may be withdrawn as desired.

CUT THROAT

Generally suicidal, rarely homicidal, and usually deeper on the left side, but as the head is thrown backwards when the cut is made, the trachea and larynx are injured while the great vessels escape. Unless there is serious hæmorrhage or respiratory difficulty, give a hypodermic injection of morphia.

Hæmorrhage has generally stopped by the time the patient is seen, and treatment is directed to preventing asphyxia, by removing blood in the lower part of the trachea and bronchi by suction through a soft catheter; tracheotomy should be performed if respiration is much embarrassed; if the trachea is wounded, a tracheotomy tube should be introduced through the wound.

As soon as respiration has been relieved and hæmorrhage arrested, a dressing should cover the wound, and the head be fixed in the flexed position, the patient sitting up.

When the patient has recovered from shock, the divided structures should be accurately sutured under an anaesthetic. The hypoglossal and recurrent laryngeal nerves are frequently divided. Special care must be taken to suture wounds of the larynx and trachea accurately.

The shock may be out of all proportion to the severity of the wound and necessitate intravenous saline.

Great care is necessary in the after-treatment, the mental condition of the patient requiring special nursing care.

CYSTITIS

Cystitis is commoner in women than in men, partly because they have a shorter urethra, partly because they become pregnant and partly because they are more constipated. In men, there is often some cause such as stone or enlarged prostate. Many cases in both sexes are associated with pyelitis. The usual organisms are *B. coli* and the staphylococcus, often together. The leading symptom is the frequent and painful passage of small quantities of urine which contains blood or pus.

TREATMENT.—Pain and strangury are best relieved by local hot applications and by some such mixture as the following:

R. Pot. Cit.	} aa gr. 20
Sod. Bicarb.	..	..	..	..	..
Tinct. Hyoscyami	..	..	..	..	3j
Tinct. Belladonnæ	..	..	..	..	℥ 5
Aq. Menth. P.p. ad	..	..	..	..	3j

(2 oz. by weight of D.D.T.). Thus 1 lb. D.D.T. will suffice for one spraying of 8 quarters, and 1 ton for approximately 18,000 quarters. In order to cover an absorptive surface properly, it is advisable to dilute the 5% emulsion with an equal quantity of water and spray at the rate of 4 c.c. per square foot.

When dealing with a mosquito which rests in cowsheds and other animal houses as well as in human dwellings, these must also be treated in the above manner.

It is most important to spray all local habitations within half a mile of the quarters to be protected so as to destroy mosquitoes at the site where they become infected.

Apparatus used.—Stirrup pump, M.I.S.H. sprayer (the continuous pressure hand sprayer designed at the Malaria Institute of India), knapsack sprayer or petrol-driven power sprayer. Nozzle orifice should be at least $\frac{1}{8}$ inch in diameter but should not exceed $\frac{1}{2}$ inch. Fine atomization is not required. The rule is to spray to wetness, stopping short of the stage when the fluid begins to run off the surface. The nozzle should be held about 1 foot from the surface treated. A fine wire gauze should be inserted behind the nozzle or stopcock.

(u) *For outdoor spraying.*—D.D.T. is applied as a 5% oily solution or water emulsion at the rate of 1 to 2 gallons per acre.

The whole surface of the ground and all likely resting places within the area to be protected and for a belt of at least 50 yards around must be sprayed. The rationale of this method is to destroy mosquitoes on their way to and from their breeding places and the source of their blood meal.

Apparatus used.—Same as above. It may also be sprayed from aircraft, at the rate of $\frac{1}{2}$ to 1 gallon per acre, as an emergency measure during military operations. It is unlikely that this method will ever come into general use for civil purposes for a variety of reasons. First, it is a very uneconomical method of application, using up a much larger quantity of D.D.T. than would be required for treating a similar area from the ground. Secondly, it is less certain than ground spraying because a slight change in the direction of the wind or lack of judgment on the part of the pilot may cause part of the area to be missed. Thirdly, its indiscriminate use may result in the destruction of insects which are useful for pollination of plants, or which prey on other harmful insects.

B. AGAINST LARVAE OF MOSQUITOES.—D.D.T. can be used as a dust but this is a wasteful method. It is usually applied as a 5% oily solution at the rate of 1 quart per acre (160 gallons of spray or 80 lbs. D.D.T. per square mile). It is effective for all types of breeding places, even if covered with vegetation, but if this is dense it may be necessary to increase the dosage. There is a danger that coolies accustomed to oiling will apply too great a quantity of D.D.T. if used in a strength of 5% and it may be necessary to dilute the solution further, to $\frac{1}{2}$ –1% D.D.T. does not destroy the eggs of mosquitoes.

Apparatus used.—As for outdoor spraying against adult insects. D.D.T. may also be applied by means of a drop bottle (beer bottle with a perforated cork and quill) or by throwing sawdust or plaster of Paris pellets soaked in D.D.T. solution into breeding places.

C. OTHER USES OF D.D.T.—For indoor application against flies and for the destruction of bed bugs, oily solutions or watery emulsions are used as for residual effect against mosquitoes. For outdoor use against flies breeding round latrines, in manure heaps, etc., it is usually applied as a 1% solution. Against lice it is used as a powder (5% or 10% in china clay, talc or pyrophyllite*) or by impregnating clothing with D.D.T. dissolved in white spirit up to 1% of the weight of the garment.

D. PREPARATION OF SPRAY.—

(1) For oily solution, 8 oz. of D.D.T. is dissolved in 1 gallon of oil (kerosene 3rd quality, fuel oil, diesel oil, crankcase oil or malariol). The mixture must be stirred at intervals to ensure proper solution. This may take 24 hours or longer, but may be hastened by placing the containers in the sun.

(2) To prepare an emulsion concentrate, dissolve D.D.T. in toluene, turpentine or medium kerosene extract to make a 20% solution. For use, add 3 or 4 parts of water to one of the concentrate. Shake thoroughly.

E. PRECAUTIONS.—It is not essential for the operator to use a mask, although for indoor work with a petrol-driven sprayer it may be found necessary to wear goggles and tie a piece of muslin over the mouth and nose. Continuous contact with an oily solution of D.D.T. is, however, said to be harmful, and therefore the wearing of clothes soaked with this over a long period should be avoided. Containers should not be filled more than two-thirds full, and sprayers (especially knapsack sprayers) should be frequently inspected to ensure against leakage. Neither solutions, emulsions nor dusts containing D.D.T. should be sprayed over foodstuffs.

All spraying apparatus must be flushed out with water after each day's work to avoid damage to hose and blockage of nozzles by crystals of D.D.T.

DISCUSSION.—D.D.T. is a very remarkable insecticide and is likely to prove an exceedingly valuable weapon in the hands of Civil Health Departments in their fight against insect-borne diseases. Unfortunately, however, it has been too widely publicized while it is still in the experimental stage and before its potentialities for good and evil have been fully worked out. There are many points yet to be determined, such as the technique of spraying, the optimal concentration of the spray under varying circumstances, the best type of apparatus for the purpose, and the length of the interval between sprayings. This last is a most important point and the evidence at present available suggests that it will vary very considerably according to different local circumstances, e.g., climatic

* Talc—hydrous magnesium silicate; Pyrophyllite—aluminium silicate.

conditions, the type and species of insect against which the operations are aimed, the type of dwelling sprayed and the material of which the walls are constructed.

One point is already abundantly clear, namely that D.D.T. cannot be applied effectively and safely at the present stage except by trained staff working under constant, expert supervision. It cannot be too strongly emphasized that in the hands of untrained personnel it is likely to prove not only ineffective but actually harmful, and its indiscriminate use is likely to bring it into discredit. This would be disastrous, since its potentialities as a weapon for combating disease are undoubtedly very great.

The extent to which D.D.T. will be used in India for civil purposes depends very largely upon the price at which it will ultimately be placed on the market. There is as yet no reliable information to hand on this most vital point. It appears at present as though watery emulsions will prove at least as effective as oily solutions, possibly even more so, and this should make the method less costly besides doing away with the pilfering which always goes on when kerosene is used as a diluent for insecticides.

A great deal of experimental work is in progress both in Great Britain and elsewhere with a view to producing substitutes for D.D.T., which is protected by patents issued to Messrs. Geigy & Co. One such preparation, known as Gammexane or 666, is now being manufactured by Imperial Chemical Industries, Ltd. This is said to be many times more powerful than D.D.T. in its immediate lethal action though its residual effect is not so persistent. It is fortunate that D.D.T. is not likely to be left without a rival, as this will no doubt prove a potent factor in bringing down the cost of it and similar insecticides to a price which may bring them within the purchasing power of the general public.

In the above account no mention has been made of the use of D.D.T. for agricultural purposes. It is expected that D.D.T. will eventually be used extensively in this sphere, but here also a great deal of preliminary experimentation is required. The dangers which may ensue from the indiscriminate use of D.D.T. in agriculture are illustrated by a recent incident in California, where it was applied as a spray to some apple trees. All insects were killed except the red spider mite, one of the most dangerous enemies of the crop, which appeared in greater numbers than ever after the application of the spray.

It is probable that the use of D.D.T. will be restricted to certain crops and that it will be applied in combination with other insecticides. For agricultural purposes, emulsions are more suitable than oily solutions on account of the possible deleterious effect of oil on vegetation.

DELHI BOIL—See Leishmaniasis.

DENGUE FEVER

Dengue and Sand-fly fever are very closely related. In both the virus is filterable and ultra-microscopic; in the former it is conveyed

by a stegomyia mosquito, which bites a patient during the first three days of his attack, but it is only after about 11 days that the mosquito becomes infective, but then remains infective for the rest of its life. As regards treatment there is no specific. Quinine is useless and only increases the headache. Give complete rest in bed, with hot applications to the joints, and aspirin internally for the pain which in some cases may be so severe as to require morphia.

DENTAL SURGERY

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In the course of medical practice, the physician and the surgeon frequently come across cases which directly or indirectly can be traced to dental disease, or, at least, aggravated by it. It is the object of the writer of this article to classify these and to suggest a means of diagnosis and a method of treatment. It is assumed that a dental surgeon is not easily available, and that the provisional treatment, at any rate, must be undertaken by the doctor himself.

These conditions can be divided into three heads:

- (1) Conditions purely dental in origin and symptoms.
- (2) Conditions, general in symptoms, of direct or indirect dental origin.
- (3) Conditions of the mouth and teeth, which are caused by general illness or constitutional derangement.

(1) CONDITIONS WHICH ARE PURELY DENTAL

- (a) Neuralgia, which may be simply toothache, or referred pain from a tooth.
- (b) Swellings in or about the maxilla or mandible, with or without pyrexia.
- (c) Fracture of teeth and jaws, due to traumatism.

(a) SIMPLE NEURALGIA OR TOOTHACHE

In simple neuralgia, which is toothache, and is confined definitely to one tooth, the tooth in question will be found to be either carious or tender to touch. The pain is caused either by food or caries irritating a live pulp, or by infection and inflammation of the periodontal membrane caused by a pulp which has died and become septic.

In the first case, the tooth, in general, is not sensitive to touch, and a dressing of oil of cloves or pure carbolic acid on cotton-wool in the cavity, will usually afford relief.

In the second case, the whole tooth will be sensitive, and will seem to the patient to be raised up in its socket, and actually may not be carious, although it usually contains a large filling. Extraction is the only successful treatment.

In both these cases, pain is frequently referred to other teeth, upper or lower, on the same side of the head. This invariably clears up when the offending tooth is treated or removed.

REFERRED NEURALGIA OF DENTAL ORIGIN.—The cases in which the patient complains of neuralgia in the region running from the jaws to the ear, temple, or in the supra-orbital region, are, in nine cases out of ten, dental in origin, and are usually caused by a dental pulp which is degenerating—sometimes under a filling in a tooth already carious, or from an impacted tooth which is pressing on the root of the tooth immediately in front of it. The diagnosis in these cases is much more difficult.

Briefly, the pain from an upper molar is referred to the temple and round the orbit, and, quite frequently, into the teeth in the lower jaw, but not to the ear.

The pain from a lower molar or premolar is most frequently referred to the ear, the temple and the teeth of the upper jaw, but rarely to the orbit. Rarely, if ever, is pain referred to the other side of the face.

The pain from the incisor teeth is more local, running along the jaw and to the eye, but rarely to the temple or the ear. With impacted teeth, the pain may not be felt in the teeth at all, being referred *in toto* to the other branches of the facial nerves. These teeth are nearly always the lower or upper third molars.

For diagnosis, the teeth should be tested individually with heat or cold, and any tooth responding unusually should be suspected. Impacted teeth can frequently be detected only by radiographic examination.

As in simple cases of neuralgia, the extraction of the offending tooth, when found, gives instant relief. It is well to remember that it is most unusual for two teeth to be affected in this way at the same time. If, therefore, the patient complains of pain on both sides of the face, causes other than dental should be suspected.

(b) SWELLING IN OR ABOUT THE MOUTH WITH OR WITHOUT PYREXIA

(i) Simple dental alveolar abscesses from teeth, in which the pulp has died, or has been previously devitalized.

(ii) Acute swelling, not in contact with the teeth.

(a) At the angle of the mandible extending down the neck with more or less trismus, caused by an impacted wisdom tooth.

(b) Submaxillary cellulitis from any abscessed lower tooth.

(iii) Cysts of dental origin.

(iv) Tumours, benign or malignant.

(i) **SIMPLE DENTAL ALVEOLAR ABSCESSES**—The patient will give a history of intense and increasing pain in one or more teeth, followed, in a few days, by a swelling, and an abatement of the pain. The glands will be affected, the tongue furred, and a slight rise of temperature may be noted. The patient usually feels ill and is constipated. Salivation is increased. A largely filled or badly decayed tooth is noted, which is tender to touch or tap. On extraction, pus is usually evacuated and the condition clears up in a few days.

In severe cases, which have been some time without treatment the

swelling, particularly if arising from teeth in the lower jaw, may point externally and either burst or require opening there, leaving a discharging sinus which will not clear up until the tooth is extracted. (*In all cases of simple alveolar abscess, fomentation on the outside of the face should be avoided.*)

(ii) ACUTE SWELLING.—If the swelling is caused by an impacted tooth, usually a lower wisdom tooth, the history is longer, or the history of previous attacks of lesser severity is usually obtained. The swelling extends to the neck, and more or less trismus occurs through the infiltration of the masseter. Pus can usually, but not always, be seen welling up from behind the last visible molar tooth. The severity of these attacks varies greatly, and some even terminate fatally.

If possible, the wisdom tooth should be extracted, but if this is not practicable the tooth in front should be removed and the condition will usually resolve. In any case, the loss of the second molar will facilitate the removal of the impacted wisdom tooth.

An upper wisdom tooth rarely causes swelling through being impacted, although it may cause considerable neuralgia through pressure on the roots of the second upper molar.

A swelling sometimes may be seen on the actual palate, situated usually about one inch back from the incisors near the middle line or even in the soft palate. There is a short history of very intense pain, which may not be definitely felt in one tooth.

Although this swelling may arise from the palatal root of molar, it almost always arises from a lateral tooth which is dead and septic. It may be necessary in addition to the extraction of the tooth to open the palate freely in order to drain the abscess.

(iii) CYSTIC SWELLING.—The third form of swelling found in the jaws is that which is *cystic* in nature, arising from the root or roots of teeth or that arising from an unerupted tooth.

In either of these cases, the history is one of very slow growth, six months or more, with complete absence of pain. The swelling which is formed inside the external plate of the alveolus extends this plate, and thins it, so that in many cases typical "egg-shell crackling" can be felt on palpation.

These cysts may occur anywhere in the jaws and may grow to a very large size, pushing back the inner wall of the antrum in the maxilla, or absorbing the body of the mandible until it is dangerously thin.

If possible, these cysts should be dissected out whole with the lining intact. Where this is not possible, they should be opened freely and scraped, and the cystic lining finally destroyed by the application of pure carbolic acid.

The packing of these cysts is, in the writer's opinion, not usually advisable, particularly if the cystic wall has been completely removed. The cavity should be irrigated with weak antiseptic daily. Healing is usually slow, but uninterrupted. If the cyst be found to involve the antrum, free drainage should be ensured until no further discharge occurs.

(iv) **TUMOURS, BENIGN AND MALIGNANT.**—The various tumours occurring in the mouth, either benign or malignant, hardly come under the heading of dental surgery, and need not be discussed here.

(c) FRACTURE OF THE TEETH AND JAWS

The diagnosis of fractures of the mandible and maxilla is, as a rule, not difficult.

The mandible usually fractures either at the canine fossa or at the angle just behind, or sometimes through the socket of the lower wisdom tooth. Fractures in the jaws are nearly always compound, and movement of the two fragments can be always felt. This movement and the disarrangement of the alignment of the teeth are a sure guide to diagnosis.

The immediate treatment is to reduce the fracture, as far as possible, and, by means of a four-tailed bandage and a stiff chin pad, to render the lower jaw immobile against the upper teeth.

As soon as possible the teeth on either side of the fracture should be wired together. The mouth should be irrigated from time to time with hydrogen peroxide, as these conditions frequently become septic.

When the patient is edentulous and is wearing artificial teeth, should these plates be uninjured, they can be used as a temporary splint with a four-tailed bandage.

Fragments of broken teeth at the site of the fracture should always be removed, but any teeth which can be left should be allowed to remain.

The diagnosis of fractures of the angle is more difficult without radiographic examination. Difficulty of opening and closing the jaws, swelling at the angle, and manipulation are the only means of diagnosis. These fractures are frequently not compound.

In these cases, a four-tailed bandage, used as in the previous cases, should be applied, and should there be much displacement of the ascending ramus, surgical wiring of the fragment is the only successful treatment, but should only be resorted to if other treatments fail.

Fracture in the superior maxilla is a less frequent occurrence and is nearly always limited to the alveolar bone and its accompanying teeth. The teeth, with the fractured portion, should be pressed back into place and held in position by some kind of splint.

All these cases of fracture should be referred to a dental surgeon as soon as possible; the sooner an efficient dental splint is fixed the greater is the chance of successful union.

(2) GENERAL CONDITIONS IN SYMPTOMS OF DIRECT OR INDIRECT DENTAL ORIGIN

The various general diseases which have been attributed to sepsis in the mouth, from time to time, are so great in number that it is hardly possible to refer to them all in this short article. Briefly, in

any complaint which may have as its cause or aggravating cause infection of streptococcal origin, the condition of the teeth or gums should be ascertained. This condition can be of two kinds:

- (i) Sepsis, with or without discharge of pus, occurring round the necks of the teeth at the gum margin.
- (ii) Infection at the apices of the teeth caused by dead pulps or infected root filling.

(i) In the chronic condition of gum infection, usually termed PYORRHOEA, the gums, though frequently slightly swollen at the necks of the teeth, are not always inflamed, and a definite discharge of pus can be detected at the gingival margin, especially on pressure. The gums frequently have receded, and the teeth appear to be loose in their sockets. X-ray examination shows that the alveolar bone has been absorbed between the teeth, forming deep pockets in which the pus is formed.

Streptococcal infection of the gums may be present without pus or swelling, but a radiographic examination will show that the alveolus is absorbed in a greater or less degree.

Although a patient may have this condition, and may, for many years, be perfectly well, the infection may, at any time, give rise to general ill-health. Generally debility, anaemia, indigestion and chronic constipation, and many diseases of rheumatic origin, such as sciatica, arthritis and fibrositis can be caused or aggravated by this condition.

Although the condition of the mouth may be improved by cleansing and mouth-washes, it is advisable, whenever possible, to remove all infected teeth; even those which are suspicious should not be retained as, when once the infection has caused general symptoms a very slight residue is sufficient to prevent these symptoms from clearing up.

Even after extraction of all septic teeth some residue of the infection may remain in the intestines and the joints and need medical treatment before clearing up.

(ii) The second condition, that is, the APICAL INFECTION, is much more difficult to diagnose as there may be no visible symptoms of any trouble. It is, however, unusual for this condition to be present in teeth which are perfectly sound and free from decay or in those which have only small fillings. Although the patient will assure you that all his teeth are free from trouble or special sensation, on tapping each tooth, one by one, a distinct difference is usually felt by him in those teeth which are not healthy.

An X-ray examination, using small films inside the mouth, will always show up the trouble. Frequently, a sinus can be seen opening into the gum above the suspected tooth.

In teeth which are affected in this way, the sepsis and the products of the sepsis shut up in the alveolus are absorbed by the blood stream, and are thus carried to all parts of the body.

Iritis, arthritis, nerve deafness, and many other diseases may

follow, should the resistance of the patient become sufficiently low. The only course is to extract those teeth which are affected.

It is difficult, in the light of our present knowledge, to differentiate between the pathological condition caused by OPEN SEPSIS, such as pyorrhoea, and what I would call CLOSED SEPSIS, such as apical infection, but there seems to me no doubt that sepsis which is occluded and, to a certain extent, forced into the blood stream, is more harmful than that which, having free drainage into the mouth, is neutralized by the digestive juices of the stomach. In time, however, the antiseptic powers of these juices being weakened, the bacteria pass on into the intestines and form fresh foci of infection there.

(3) CONDITIONS OF THE MOUTH OR TEETH CAUSED BY GENERAL ILLNESS OR CONSTITUTIONAL DERANGEMENT

Certain illnesses or pathological conditions may cause direct trouble in the mouth. These are:

- (i) Measles, scarlet fever, smallpox, and diabetes.
- (ii) Phosphorus poisoning, mercury poisoning; lead and arsenic poisoning will also directly affect the jaws and teeth.

(i) DISEASE IN THE JAWS AND TEETH FOLLOWING MEASLES, SCARLET FEVER AND SMALLPOX is rare, and almost always confined to children. The cases are very similar. From four to six weeks after the commencement of the diseases, the gum is seen to be separating from the teeth, until a large portion of the alveolus is involved. Ulceration follows, and the whole of the alveolar border, with temporary and permanent teeth, may be exfoliated. The necrosis never involves the body of the jaw.

The mouth should be kept very clean, with as little interference as possible, and when any sequestrum is definitely loose it should be removed. The patient's health should in all cases be carefully looked after.

(ii) METALLIC POISONS.—

(a) Phosphorus necrosis may occur in factories where the workers are handling phosphorus. The poison is said to enter the alveolus via a decayed and septic tooth. Acute inflammation of the periodontal membrane, together with necrosis of the alveolus, follows. Cleansing of the mouth with antiseptics is the only local treatment. Surgical interference should be avoided.

(b) Continual absorption, accidental or otherwise, of mercury salts will cause inflammation and puffiness of the gums and loosening of the teeth—a condition very similar to that described in Vincent's angina. The history of the case is sufficient to determine diagnosis.

The treatment is the removal of the cause, and the antiseptic and astringent mouth-wash.

(c) In cases of general lead poisoning, a typical blue line is seen round the necks of the teeth, just under the gum margin. The teeth may become slightly loose, but the local irritation is usually very slight and clears up with general treatment.

(d) Cases of arsenical necrosis in the mouth occur directly from a dressing of arsenious oxide, which has been used to devitalize a dental pulp, and which has leaked into the gum margin sloughing it away and then attacking the alveolar bone. The necrosis may be severe and large portions of the alveolus may come away. If the condition is acute the tooth in question should be extracted, and the socket and surrounding tissue frequently flushed with a mild antiseptic. The necrosed alveolus should be allowed to come away by itself.

The following suggestions as to MOUTH-WASHES may be useful:

For General Sepsis with Pus
 B Hydrogen Peroxide . 12 vols.
 To be used with three parts of warm water.

For Inflammation without Pus (Astringent)
 B Potassij Chloralis 3ij
 Pulveris Aluminis . 3ij
 Aquam ad .. 3x

For Pain following Extraction
 Carbolic Mouth-wash and Hydrogen Peroxide alternately, or

B Acid: Carbol. Glacial. .. 3j
 Liq Pot. . .. 3j
 Aquam ad .. 3viij
 Use as mouth lotion.

For Irrigating Cysts which are Non-septic
 B Glycothymoline.

THE EXTRACTION OF THE TEETH, WITH NOTES ON THE USE AND CONTRA-INDICATION OF LOCAL ANAESTHESIA

The general method of extraction is well known, but a few suggestions in regard to the removal of individual teeth may be of use to medical men who may be compelled to carry out a task which they invariably dislike. Upper molars are best extracted by bending outwards, especially the upper third molars, the external alveolar plate being always much thinner than the internal, which is, in fact, the harder bony structure of the palate. Upper molars having two roots, or one root very much flattened should be removed in the same way. With upper canines, laterals and centrals the roots are single and more or less conical, and can, therefore, be rotated in a more or less degree and then extracted outwards.

In the lower jaw, the third molar is best removed by means of a straight elevator inserted below the alveolar margin in front of the tooth, and so used as to lift the crown upwards and backwards. Forceps should not, as a rule, be used until the tooth is lifted almost out of its socket as the alveolar ridge is much thickened in this region. *First and second lower molars* can often be pressed inwards, as well as outwards, to loosen them, and no attempt at rotation should be made.

Lower premolars have nearly always conical roots, and should be rotated, and the same applies, in a lesser degree, to lower canines. The lower incisors rarely present much difficulty as the external alveolar plate is usually thin, but owing to the flatness of the root rotation should not be attempted.

In all cases of extraction the operator should force his instrument

More severe or chronic cases often clear up with Whitfield's ointment, which is as follows:

R. Acid. Benzoic.	..	..	..	gr. 30
Acid. Salicylic.	..	..	..	gr. 15
Paraff. Moll. ad	..	..	..	3j

Chrysarobin or, better, Derobin (Glaxo) is the most useful remedy, as follows:

R. Chrysarobin	..	gr. 30	R. Derobin (Glaxo)	..	gr. 1
Paraff. Moll. ad	..	3j	Acid. Salicylic.	..	gr. 5
			Hydrag. Ammoniat.	..	gr. 10
			Lq. Carbonis Detergent.	℥	30
			Paraff. Moll. ad	..	3j

Either of these should be gently rubbed into the affected area only, twice a day for about a week. Excessive reaction is treated with calamine lotion and 1% silver nitrate solution.

In a severe, inflamed case any secondary infection must be treated first, with fomentations, calamine lotion or Cibazol ointment.

DIABETES INSIPIDUS

Large quantities of pale urine containing no sugar are passed, and the cause is lack of posterior pituitary secretion.

The best treatment is with Pituitary snuff, of which about 40 milligrammes are snuffed up the nose three or four times a day; alternatively a piece of cotton-wool soaked in Pituitrin or Pitressin may be placed in the nose, or the drug may be given hypodermically.

DIABETES MELLITUS

This is one of the few diseases of which it can be said the older the patient the better the outlook.

DIAGNOSIS—The disease is often discovered by accident, in which case it is generally not severe—except in a child—but if a patient complains of thirst and polyuria and has sugar in the urine, he almost certainly has fairly severe diabetes mellitus, and will require insulin treatment for the rest of his life.

In a normal person the percentage of sugar in the blood never rises above 0.18%, but two types of abnormality exist; the patient may be a diabetic, in which case the sugar rises higher than this, passes the renal threshold and appears in the urine; alternatively the blood sugar is normal, but the renal threshold is low, so sugar begins to appear in the urine when its concentration in the blood is only about 0.14% or even lower.

It may be said at once that the latter is not serious, is very much rarer than the former, never causes a high percentage of sugar in the urine, and is seldom associated with sugar in every specimen of urine taken during the 24 hours, those taken before meals often showing no sugar.

Before treatment is undertaken, the patient is given a general examination, his blood pressure is recorded, his eyes are examined,

septic foci are carefully looked for, especially in and around the teeth and if present, eliminated. Constipation is also treated if present. These latter measures in themselves will improve the patient's condition and may even render insulin unnecessary in a border-line case. The patient is also instructed how to give himself insulin injections, is given information about diet and shown how to test his urine.

The aim of treatment is to steer the patient between diabetic coma on the one hand and hypoglycaemic reactions on the other, to allow him to eat an ordinary diet as nearly as possible, and to provide him with enough nourishment to enable him to enjoy his work, his leisure and his life.

Diabetics are unusually liable to certain diseases, of which tuberculosis is the most common, others being arteriosclerosis, gall-stones, cataract and chronic and acute sepsis, the last named being apt to raise the blood sugar and necessitate a temporary increase in insulin dosage. Further, diabetics should not be anaesthetized with chloroform.

BASAL DIET.—This contains the number of calories theoretically necessary to keep alive a patient who lies in bed and does not work, the number required for this unambitious purpose being 25 calories per 24 hours per kilogramme (2·2 lb.) of body weight, or about 1 calorie per kilo per hour.

The "large calorie" is the unit, that is to say, the amount of heat required to raise the temperature of 1 litre of water 1 degree centigrade. (The interesting deduction seems to be that the human body uses heat at about the rate of one degree centigrade per kilogramme per hour.)

The number of calories in the diet must be increased by the extra amount consumed by the patient in living his normal life. Manual labourers require 30 to 40% increase and sedentary workers about 25%; this is known as the *maintenance diet*. Those who are overweight require less and those who are underweight require more. Children always require more because they are growing, and they always require insulin, otherwise they will die within two years.

It is not proposed to go into minute and boring details of arithmetic, but knowledge of certain simple facts is necessary for intelligent treatment.

A gramme of carbohydrate or protein yields 4·1 calories and a gramme of fat yields 9·3 calories, the approximate figures 4 and 8 being accurate enough for our present purpose. The usual diet given to diabetics nowadays is about a quarter protein, a quarter fat and half carbohydrate. In other words the fat and carbohydrate calories are equal, and the protein calories about half of either.

To take a concrete case; a patient weighs 8 st. 2 lb. = 110 lb. = 50 kilos; his basal diet is 25 calories per kilo = 1,250 calories. Add 20% for light sedentary work = 1,500 calories; of which protein will yield about 300 and fat and carbohydrate about 600 each. The weight of food required in 24 hours is, therefore:

Protein:	$\frac{300}{4} = 75$ grammes or $2\frac{1}{2}$ ounces
Fat (approx.):	$\frac{600}{8} = 75$ grammes or $2\frac{1}{2}$ ounces
Carbohydrates:	$\frac{600}{4} = 150$ grammes or 5 ounces

These figures are easy to remember, and represent about the minimal requirement of the human adult.

For some reason, diabetes is not usually so serious in India as it is in countries that take themselves more seriously. Clinically, diabetes can be divided into three grades in the adult:

- (1) Slight, controllable by dieting.
- (2) Moderate, requiring insulin and dieting.
- (3) Severe, requiring accurate insulin dosage and dieting, based on laboratory findings and checked up every six months.

In children there is one grade—severe.

(1) **SLIGHT.**—This may be discovered in the course of an examination for life insurance, but more commonly because the conscientious doctor examines the urine of a patient who complains of boils, of getting easily tired, of passing a good deal of urine or volunteers the information that sugar has been found in his urine; he is often fat and often wealthy.

- (a) Put the patient to bed for 24 hours on a diet of water, 4-hourly specimens of urine being tested for sugar (*see* Laboratory Methods, Simple).
- (b) If there is no sugar in the urine at the end of 24 hours, the case can probably be controlled by dieting. If there is sugar, insulin will be required, and the case is either moderate or severe, which are discussed later.
- (c) The next step is to give the patient a gradually increasing diet in the proportions by weight of one protein, one fat, two carbohydrate, and to watch the effect on the urine. The limit of toleration is reached when the specimen passed before a meal contains no sugar and that passed 14 hours after contains a small amount. If the diet producing this effect is adequate for the patient's needs, which are usually between 2,000 and 3,000 calories a day (400–600 from protein, 800–1,200 each from fat and carbohydrate) all is well and the diet is *stabilized at this quantity, namely 100–150 grammes (3½–5 oz.) each of protein and fat and 200–300 grammes (7–10 oz.) of carbohydrate*. As it is generally impossible to weigh protein, fat and carbohydrate separately, the percentages found in various common foodstuffs are given in the table at the end of this article.

(2) **THE MODERATE OR AVERAGE CASE.**—If, after the 24 hours' starvation in bed, the urine still shows sugar, insulin is required, so proceed as follows.

- (a) Let the patient get up and put him on a basal diet yielding about 1,500 calories a day, and half an hour before the morning meal and half an hour before the evening meal give 5 units of insulin.
- (b) Keep him on the basal diet, if necessary increasing the insulin by 5 units at each injection, until the specimen of urine passed after the morning meal is sugar-free.
- (c) When this occurs, keep the patient on the same dose of insulin, but gradually increase the diet until sugar reappears.
- (d) If by now, the diet is insufficient for the patient's needs increase the insulin by 5 units at each injection until the urine is again sugar-free, after which the diet is once more increased.
- (e) This see-saw method is continued until the diet is adequate for the patient's needs; it is not so complicated as it sounds, and has the advantage of requiring no elaborate apparatus or tests; further, it avoids the danger of diabetic coma or hypoglycaemia and gives a very good approximation of the patient's insulin and food requirements.
- (f) Perhaps because of the rest given by the administration of insulin, the pancreas often begins to secrete more insulin, so the urine should be tested for sugar at least once a week at the beginning of treatment and it will often be found that the dose of insulin can be decreased, and occasionally it can be omitted altogether.
- (g) Most average cases do very well on 5-10 units of insulin, half an hour before breakfast and the same amount half an hour before the evening meal; a total of 10-20 units a day.

(3) **THE SEVERE CASE.**—Coma, childhood, complications, ketosis, emaciation, severe glycosuria and perpetual thirst are the signs of a severe case.

Coma must be carefully distinguished from hypoglycaemia, otherwise insulin will kill the patient; the points of distinction are given later.

The severe case is best treated in hospital to begin with; the principles of stabilization are much the same, but larger doses of insulin are given and the increase in dosage is more rapid. Blood-sugar estimations are also made.

Ketosis.—This is due to the presence of imperfectly metabolized fats in the blood, which instead of being broken right down to carbon dioxide and water, stop at β -oxybutyric acid, acetoacetic acid and acetone. Acetoacetic acid is the most toxic and used to be held responsible for the onset of coma, but it is now thought that coma occurs because not enough carbohydrate is being broken down to satisfy the requirements of the brain. The presence of acetoacetic acid in the urine is, however, a very useful indication that coma is not far off. As this acid is a powerful respiratory stimulant, it is probably responsible for the air-bunger so typical of diabetic coma.

DISTINCTION BETWEEN DIABETIC COMA AND HYPOGLYCAEMIA

	<i>Diabetic Coma</i>	<i>Hypoglycaemia</i>
<i>Warning symptoms</i>	Headache, nausea, abdominal discomfort, wants to breathe deeply	Tremors, sweating, hunger, faintness. (N.B.—Patients who have had previous attacks recognize the symptoms)
	Probably not having insulin	Under insulin treatment
<i>Signs</i>		
Breathing	Deep	Shallow
Skin	Dry	Moist
Pulse	Rapid	Normal
Eyeballs	Soft	Normal
Urine	Contains sugar, acetone and acetoacetic acid	No sugar unless present in bladder since before causative insulin injection
Breath	Smells of acetone (many people cannot smell it)	No smell of acetone
<i>Treatment</i>		
Immediate	50–100 units of insulin subcutaneously with 20–50 c.c. 10% glucose solution intravenously. If the swallowing reflex is present, 50–100 grammes (1½ to 3 oz.) of sugar may be given in water by the mouth or through a stomach tube	50–100 grammes of sugar by mouth or 100–200 c.c. of 10% glucose solution intravenously
	Coramine, nikethamide or some such heart stimulant	Adrenaline or Pituitrin injections to mobilize liver sugar
Later	Repeat insulin, half initial dose, with glucose or sugar in proportion, every 3 hours until the patient is conscious and the urine free or nearly free from sugar	Repeat sugar if there is any sign of returning symptoms. If patient is having zinc protamine insulin give sugar at two-hourly intervals for eight hours and take him off Z.P. Insulin for the time being
	Work out diet and insulin dosage	Reduce and readjust insulin dosage, but an unintelligent patient or attendant may have given the wrong dose

INSULIN—"Insulin enables the tissues to store glycogen and to utilize glucose as a source of energy; it inhibits the excessive formation of glucose from non-protein sources, and by restoring carbohydrate metabolism to a normal state, it arrests the mobilization of stored fat and stops the formation of ketone bodies." (Samson Wright)

Soluble Insulin begins to take effect within half an hour, the maximum being exerted from the second to the fourth hour, after which its effect decreases and reaches zero at about the eighth hour. It is put up in strengths of 20, 40 and 80 units per c.c.

Zinc Protamine Insulin is much less soluble, so it does not begin to take effect for 3 hours, the maximum being reached 8 hours after injection and lasting up till the 20th or 24th hour. From these facts two deductions can be made (1) zinc protamine insulin is injected at longer intervals than ordinary insulin, a great advantage from the patient's point of view because it often means one instead of two

injections a day (2) hypoglycaemia is more likely, a drawback from everybody's point of view.

In general, it is better to stabilize a patient on ordinary insulin, two doses a day; when the change is to be made, the evening dose is omitted and the same amount of zinc protamine insulin added, in a separate syringe, to the morning dose and injected in a different place or after the needle has been moved under the skin. The amount of ordinary insulin is decreased by about two units a day and the amount of zinc protamine insulin increased by the same amount until only zinc protamine insulin is being given.

The maximal safe dosage is usually considered to be 30-40 units in 24 hours and the injection is given half an hour before the morning meal. If supplementation is required in the evening ordinary insulin must be used, otherwise in the early hours of the morning the patient may pass from sleep via hypoglycaemia into death.

AFTER-TREATMENT UNDER INSULIN.—Once a week the patient should test his urine with Benedict's solution; the urine should be passed at different times of the day, especially if zinc protamine insulin is being used. A slight amount of sugar is no drawback, because it is usual for the insulin requirement to get less, and if the patient is not passing sugar on any occasion the dose of insulin probably can be reduced, otherwise there is a risk of hypoglycaemia.

The patient should always have a few lumps of sugar in his pocket or under his pillow to be taken if he feels any symptoms of hypoglycaemia, which is most likely after exercise.

CHILDREN.—The seriousness of the disease has already been emphasized. Other points that must be noted are that children are more liable than adults to develop coma or hypoglycaemia, so the insulin must be carefully adjusted. They also require about twice as many calories per kilo as adults do. Children's complaints such as measles, colds, tonsillitis or influenza may cause quite a large temporary increase in insulin requirements. Insulin should be injected three times a day in infants, twice in older children; zinc protamine insulin is generally considered unsuitable for children owing to the risk of hypoglycaemia.

PREGNANCY.—The dose of insulin generally has to be increased after the sixth month and cut down during the puerperium. Insulin does not harm the foetus.

ORAL TREATMENT.—In spite of flagrant advertisements of nostrums with inviting names there is no medicine so far discovered which, when taken by the mouth, is of any permanent benefit. Synthalin, of which much was hoped, has proved disappointing, but as it has the effect of slightly reducing the blood sugar it is occasionally given in doses of 15 mg. with 5 mg. of Decholin, three times a day on three days in the week. It is liable to affect the liver, causing jaundice, and the stomach, causing indigestion. Codeine phosphate is an old remedy which slightly decreases the sugar in the urine and was given without real benefit in the days before insulin.

OPERATIONS.—The usual method is to give 30 units of insulin and 50 grammes of glucose one hour before operation, in addition to the usual dosage, if insulin is already being given. Spinal or local anaesthesia is the best, next come gas and the barbiturates, and then ether; never give chloroform.

After-treatment.—The patient should have his usual dose of insulin and should consume about 100 grammes (3 oz.) of glucose daily until he is back on his ordinary diet.

O'Meara recommends the following as a suitable diet for an Indian diabetic:

Early morning: Milk 12 oz. with a chapati made of almond flour or coconut.

Noon. Chapati or rice, in moderation, dhal, green vegetables, especially spinach, fruit and a small quantity of ghee.

7 or 8 p.m. Curds (Dahi) or milk with a coconut cake. The juice of fresh limes should be drunk with water at least twice daily.

TABLE OF PERCENTAGE COMPOSITION AND CALORIE VALUE

Foodstuff	Protein	Fat	Carbo- hydrate	Calories per lb.
Biscuits	9	1-12	70	1,900
Bread	9	1-5	50	1,200
Butter	1	80	0	3,400
Carrots	1	0.5	8	180
Chapati	10	0.5	50	1,000
Coconut oil (Vanaspati)	1	85	0	3,500
Dal	20	2.5	55	1,500
Figs	12	10	0	700
Fruit, dried (average)	2	1	60	1,500
Fruit, fresh				
Apples	0.4	0.5	13	290
Apricots	1.0	0	13	270
Bananas	1.5	1.0	21	460
Grapes	1.3	1.0	15	450
Mangoes	0.6	0.4	10	220
Melons	0.5	0	7	160
Oranges	0.8	0.2	11	240
Peaches	0.7	0.1	6	190
Pears	1.0	0.5	16	250
Pineapples	0.5	0.3	10	200
Pomegranates	1.5	1.5	17	450
Fish (average)	30	5	0	500
Ghee	1	85	0	3,600
Green vegetables (raw)				
Cabbage	2	0.6	5	150
Cauliflower	2	0.5	7	170
Cucumber	0.75	0.2	3	80
Pumpkin	1	0.1	5	95
Spinach	3	0.5	3	110
Vegetable marrow	1	0.1	5	120
Jam (average)	0.5	0.5	60	1,000

TABLE OF PERCENTAGE COMPOSITION AND CALORIE VALUE—*continued.*

<i>Foodstuff</i>	<i>Protein</i>	<i>Fat</i>	<i>Carbo- hydrate</i>	<i>Calories per. lb.</i>
Meat				
Bacon	10	50	0	2,200
Beef	20	10	0	800
Chicken	20	5	0	600
Goat	24	2 5	0	950
Ham	14.5	35	0	1,650
Mutton	18	18	0	1,200
Veal	20	7	0	700
Venison	20	2	0	800
Milk				
Buffalo	5	7 5	5	600
Cow	3 5	3 5	5	400
Goat	4	4 75	4 5	500
Nuts (average) ..	10	50	10	3,000
Onions	1	2	5	180
Peas (dried)	25	1	60	1,500
Potatoes (boiled) ..	2	0	20	400
Rice	7 5	0 5	80	1,500
Sugar	0	0	100	1,800
Turnips	1	0	9	200

DIARRHOEA

Diarrhoea can be divided into acute and chronic, while diarrhoea in children requires special consideration.

ACUTE DIARRHOEA.—The commonest cause is contaminated or decomposed food; other causes are over-eating, over-dosage with aperients and "chill on the stomach", which may be a clinical entity or a cloak for our ignorance; it is, however, a fact that many people get diarrhoea after a sudden change of temperature such as occurs when they sleep under a fan or go to the Hills. Diarrhoea is also a very common accompaniment of malaria.

When one considers the amount of "dry" and non-existent sanitation in India, which means that every day millions of motions are lying exposed to be fed on by flies which quickly transfer their attentions to someone's food, the miracle is that intestinal diseases are not more prevalent.

In cases of diarrhoea it is important that the physician should see the stools whenever possible so that he can decide whether there is any likelihood of dysentery or cholera.

CHRONIC DIARRHOEA.—By far the commonest cause in India is mild amoebic or bacillary dysentery (*see* Dysentery). Another cause is giardiasis (*lamblia*) which can be dismissed with the remark that a tablet of mepacrine (*Atebrin*) 3 times a day for a week cures it. Other causes are as follows.

Hypochlorhydria produces intestinal irritation in two ways; the gastric juice does not digest the food, and it does not kill noxious organisms.

Defective digestion of one or more of the chief constituents of the diet includes inability to digest carbohydrates, fats or proteins, producing flatulent, fatty or "putrid" diarrhoea respectively.

In an old man with chronic diarrhoea smell the breath for uraemia and examine the prostate for enlargement.

Oddly enough, constipation can cause diarrhoea because the presence of hard scybalae irritates the colon to secrete mucus which is passed at frequent intervals; the diagnosis is made by examining the rectum after a motion has been passed, when the scybalae can be felt. Treatment is to wash them out.

A rectal growth has a similar effect and may cause frequent and futile calls to stool. Hepatic cirrhosis, or congestion due to right heart failure can cause chronic diarrhoea as also can alcoholism. Colitis is considered elsewhere.

Lienteric diarrhoea, in which the patient passes or wishes to pass a motion after each meal, is an atavistic exaggeration of the normal gastro-colic reflex so prominently exhibited by tonga ponies. It can be improved or cured by bromides or self-control. The following prescriptions are also useful.

R	Sod. Bromid.	..	..	..	gr. 12
	Tinct. Opu	..	..	..	℞ 5
	Aq. Chlorof. ad	..	..	..	3ss

half an hour before meals.

or the following pill half an hour before meals.

R	Codeine	..	..	..	gr. 1
	Ext. Belladonnae Sicc.	..	..	..	gr. 1
	Pulv. Glycyrrhizae Co.	..	..	..	gr. 2
	Pulv. Tragacanth.	..	..	..	q.s.

Nervous diarrhoea is familiar to most of us who have been up for examinations, but afflicts some people on much less provocation; the treatment is for the patient to hold his (or her) motion until the desire passes off. Certain people have a low-grade streptococcal infection of the bowel, often from a focus such as the appendix or even the tonsils or nasopharynx, so these organs should always be examined.

Other causes of diarrhoea are tuberculous enteritis, pelvic peritonitis, hyperthyroidism, jaundice, septicaemia, the enteric fevers, sprue, typhus fever, pernicious anaemia, and last but not least, because it will never be diagnosed if it is not suspected, arsenic poisoning.

Treatment is that of the cause, but if this is not obvious the wisest thing to do is to start by giving a course of sulphaguanidine, 8 tablets for the first dose and 4 tablets every 4 hours thereafter for four days. Emetine injections may also be tried even though Entamoebae or cysts cannot be found in the stools, and the organic arsenicals such as Stovarsol and Carbarsone, one tablet twice a day for 10 days, will often clear up a troublesome diarrhoea.

If there is a great deal of flatulence, diastase (Taka-Diastase) and charcoal will reduce it, and if hydrochloric acid is deficient, Acid. Hydrochloric. Dil., 90 minims in orange juice may be drunk during meals. Chlorodyne is an old and well-tried remedy, its imitations Camphorodyne and Tinct. Chloroformi et Morph. Co. not being so good.

HILL DIARRHOEA.—The characteristic of this disease is that the patient passes jaundice-like stools without having jaundice. The aetiology is disputed, some calling it an infection and others a deficiency; it is sometimes a forerunner of sprue. The best remedy is

R	Liquor. Hydrarg Perchlor (1-1,000)	..	3j
	Bismuth. Subcyat.	.	gr 20
	Aq Menth. Pip	.	ad 3j

One ounce before meals

Chlorodyne may be added if the diarrhoea is severe.

DIARRHOEA IN CHILDREN.—This should always be taken seriously. It may be due to dysentery, and, in babies, is often a manifestation of some general infection. The motions should be inspected carefully for colour, consistency, mucus and blood; the presence of these last two does not necessarily mean that the child has dysentery, the infant bowel being very tender.

Treatment.—Keep the child warm and give fluids by the mouth or subcutaneously if there is dehydration. In a mild case a teaspoonful of castor oil is given and in all cases it is advisable to give sulphaguanidine, the dose being half a tablet for every year of age every three hours, the first dose being a double one. A warm bowel wash with normal saline is often helpful.

Plenty of water but no food should be given for 24 hours, after which glucose water or rice-water may be given, followed next day by Horlick's or condensed milk. Many children will digest Nestlé's sweetened condensed milk when they can digest nothing else.

The following mixtures have a soothing effect on inflamed bowels.

R	Bismuth Carb	.	gr 10
	Kaolin	.	gr 15
	Chlorodyn	.	℥ 2
	Syrup Simpl.	.	℥ 30
	Aq ad	.	3i
	dr 2, o 4 h		
R	Cretae Praeparatae	..	gr 20
	Pot Citrat	.	gr. 5
	Glycerin.	.	℥ 20
	Aq Menth Pip ad	.	3j
	dr 2, o. 4. h		

DIET (See also Vitamins and Diabetes.)

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Food is a substance which, when taken into the body, is able to build up or repair tissues, protect against ill-health (disease), and supply material for the production of health and energy.

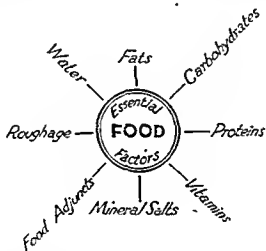
The chief food substances essential for the maintenance of efficient nutrition and health are proteins, fats, carbohydrates, vitamins, salts, water, roughage, and condiments. These are shown in the sketch given below.

Perfect nutrition depends upon the co-ordinate action of each of these essential constituents of food.

We will now consider the properties of these food factors and their sources. It should be remembered that most foodstuffs contain

more than one of these factors in varying proportions. Proteins, fats and carbohydrates are derived from the organic kingdom; mineral salts and water from the inorganic kingdom.

PROTEINS (Flesh-forming foods).—These are the most important of the food factors, and are essential for building and repairing the muscles and tissues. They are found both in animal and vegetable foods. In general, proteins derived from vegetables are of low biological value as compared with those derived from animal foods. Proteins are divided into two classes; class A and class B proteins. To the former belong milk, cheese, eggs, meat, fish, to the latter cereals (rice, millet, flour, yeast, soya bean, etc.), potatoes, pulses, beans, lentils and peas, green vegetables, oatmeal, fruit, mushrooms, etc.



Milk, cheese, eggs, meat and fish are more valuable because they are protective foods. A diet composed of both animal and vegetable proteins is better than one of vegetable protein alone. The important point to remember is that the body is unable to make the best use of large, infrequent meals of proteins. Therefore, it is advisable to spread the protein intake over a week. A long-continued deficiency in proteins in diet will impair growth.

PROTEIN REQUIREMENTS.—This varies with the age of the individual.

- (a) *Children.*—Because of their relatively larger surface and rapid growth, children need more proteins.
- (b) *Old People.*—It is dangerous to reduce the normal intake of the aged. They digest proteins readily, and need them for maximal efficiency.

- (c) *Expectant and nursing mother.*—Pregnancy and lactation demand a high protein intake. It helps the growth of the foetus. A mixed diet of meat, eggs, milk and milk products, and leafy vegetables is beneficial.
- (d) *During convalescence.*—Persons recovering from illness or operation, need more proteins to build up their wasted tissues.

Note.—Recent experiments indicate that a high protein diet is essential to safeguard against infection.

Fats serve to diminish protein metabolism and are called protein sparing foods. If flesh alone is given, large quantities are required to balance nutrition and waste, but by the addition of fat the demand for flesh is diminished. Fats have an important relationship to the production of energy and heat in the body. Fats are also a great source of vitamins A and D. Too much fat, however, reduces appetite, and may cause indigestion.

Carbohydrates.—Carbohydrates are necessary constituents of diet, and are the body's chief source of energy. They play the same part as do fats in food for the production of energy and heat. They are more easily assimilated than any other class of food.

Sources of proteins, fats, and carbohydrates along with their functions in the body, are given below in a tabulated form:

	Sources	Functions
Proteins	Flesh, eggs, milk, fruit, wheat, corn, soya-beans, pulses, lentils	1. Provide material for growth, and wear and tear of tissues 2. Provide energy
Fats	Animal and vegetable oil, ghee, meal, milk and milk products, cheese, nuts, coconuts, soya-beans	1. To produce heat and energy 2. Mechanically protect tissues from injury 3. Give shape to the body by filling hollows
Carbohydrates	Cereals, vegetables, tubers, fruits, sugar cane, beet-root and seeds	1 To provide energy and heat 2 Important factor in the maintenance of body heat

Roughage is the indigestible portion of food. It is essential to stimulate intestinal movements and thus prevent constipation. It consists of bran, the polsbings of grain and rice, the skin and fibre and soft tissue or cellulose of vegetables and fruit.

Food adjuncts (Condiments, spices, etc.) are necessary to make food palatable, to excite digestive juices, and create a desire for food. They also contain some quantity of vitamins and minerals.

Water is also absolutely necessary for the maintenance of life. It forms 64% of the body weight. It is utilized as food for building

tissues of the body, maintaining the fluidity of the blood, and helps in the excretion of waste matters.

Remarks.—Since no single food contains all these essential properties in adequate proportion as such, a “balanced diet” should contain all the above substances in adequate proportions. This will also provide variety in food, which is essential, not only to break its monotony, but for securing the correct type of food essential for the proper growth of the body.

MINERAL SALTS.—

Mineral salts form about $\frac{1}{2}$ th of the body weight, and are essential for the maintenance of the body.

Functions in the body.—

- (1) To stimulate digestive secretions.
- (2) To maintain the tone of the muscles, nerves and blood.
- (3) To help the general growth of the body.
- (4) To help to maintain acid-alkali balance.

Calcium and phosphorus are essential for the building of the skeletal bones and teeth. Iron is required for the blood, and is part of the haemoglobin molecule. Goitre (which is a simple enlargement of the thyroid gland) is the result of a deficiency of iodine in food and drinking water. If children from birth suffer from an insufficiency of thyroid secretion they develop stunted growth and become ngly, dwarfed and semi-imbecile. Iodine is used for the prevention and cure of such conditions. The thyroid gland contains some iodine. These salts are present in food, particularly in the outer layers, i.e., the bran of the grain and seeds and the skins of fruit and tubers. They are lost when we throw these portions away. Salts are further lost by throwing away the water in which the foodstuffs are cooked.

MINERAL REQUIREMENTS AND THEIR CHIEF SOURCES

<i>Mineral</i>	<i>Amount required (per day)</i>	<i>Sources</i>
Iron	30–40 mg.	Wheat, wheat, nuts, eggs, liver, heart muscle, eggs, oats, pulses, soya-beans, peas, spinach, lettuce
Calcium	0.8–1.3 gm.	Milk, rice, leafy vegetables, green turnips, cauliflower
Phosphorus	1.0 gm.	Eggs, peas, milk, fish, meat, cereals
Sulphur	1.0 gm.	Cabbage, yolk of egg, drumsticks, milk
Iodine	Traces	Seafish, sea salt, seafish-liver oil

CEREALS

Cereals contain a large quantity of nutritive material condensed in small bulk and a considerable proportion of mineral substances, the most important being phosphates of calcium, magnesium and a certain amount of iron. The nutritive value depends upon the high carbohydrate content. The cereal proteins are generally of a low biological value. When supplemented by a relatively small amount

of class A proteins, for example that obtainable from milk, the cereals can supply a large proportion of the protein requirements essential for nutrition. The different nutritive ingredients—protein, carbohydrate and fat are all present in cereals; they are rich in nitrogenous substances and starch, but poor in fat and calcium, except ragi, which is rich in calcium. *Millet*s are inferior to wheat in proteins but superior to it in fat. A mixture of cereals in the diet is thus preferable to one consisting of a single cereal.

Wheat.—This is the most important of all cereals, and is extensively used. A grain of wheat, free from the husk when ground between millstones (chakki) and sifted, is separable into bran and flour. Flour is divided into 3 portions; suji is the coarse bran derived from the outer coat of wheat, and it contains a high proportion of proteins and vitamin B; ata is the next layer of final grain, and the fine wheat flour is maida, which is produced from the innermost layer. Bran is rich in nutriment, and is composed of nitrogenous matter and fat. It is also rich in mineral matter and cellulose. The wheat germ is rich in protein and fat, the endosperm in starch (carbohydrate). Wheat ata used for the preparation of different articles of food should always be fresh.

Rice.—Of all the cereal grains rice is poorest in protein, fat, mineral salts and vitamins. It is very rich in starch. Parboiled rice provides just enough vitamins for the needs of the body, but when polished rice is used most of the vitamin content in the whole rice grain is removed with the outer layer. The small amount of protein present is of high biological value.

Cooking of rice.—Rice should be lightly washed in cold water before cooking. Boiling is the common method of cooking. The boiled rice is usually strained, and the water thrown away, which causes a loss of vitamin B which is soluble in water. By the process of boiling, some of the proteins and mineral salts are also lost. The economical method of cooking rice is by steaming, as then the protein and salts are not dissolved. Only enough water should be used to boil rice so that none is left to be thrown away.

Maize (Makai).—This is as nutritious as wheat, and is richer in fats than all other cereals except oats. It is deficient in vitamins and the amount of essential mineral salts is very small. An exclusive diet of maize protein, owing to its low biological value, has been suggested as a possible cause for pellegra, a deficiency disease.

Millet (Juar).—This is one of the common food grains used in India. It is eaten as khichri, or chapati, made out of flour. The nutritive value is midway between wheat and rice.

Oats.—A nutritive food, but it is not widely used in India as it is difficult to make it into a chapati. Oats are deficient in vitamins A and D and should be eaten with plenty of milk; in the form of porridge and gruel it makes a nutritious breakfast.

PULSES

Pulses are used in India in the form of "dals". There are many varieties of "dals". They are rich in proteins and also contain salts

of potassium and lime, and sulphur. Lentils (Mussur) are rich in vitamin B and contain a large amount of nitrogenous substances. They are rich in iron and phosphate of lime. Pulses, such as peas, beans, lentils and gram, also have building value and are therefore useful for supplementing the meat ration. They should be used with vegetables, and not as an alternative to green or root vegetables.

Value of pulses.—

- (1) An excellent source of proteins.
- (2) Rich in lime, phosphorus and iron.
- (3) Contain much starch and little fat. They go well with fat dishes.
- (4) Storable for a long period without impairment of their food value.
- (5) Economical, because they increase in bulk and weight if soaked in water.
- (6) Contain vitamins A and B.
- (7) Yield vitamin C if allowed to germinate.
- (8) Can be used as a source of vitamin C in this form when fruit is scarce and dear.
- (9) They are cheap; use them plentifully.

POTATO

The most important of the tubers is the potato. It supplies, at low cost, abundant carbohydrates, some protein and vitamins B and C. The vitamin C content of potatoes is considerable and less liable to damage in the process of cooking than occurs in green vegetables. Vitamins are present in the outer layer of the tuber. Potatoes should be peeled as thinly as possible. Better still, they should be boiled or cooked in their skins to conserve vitamins.

VEGETABLE VIRTUES

Vegetables are splendid protective foods. When milk, eggs and meat are expensive one has to depend upon vegetables, especially green vegetables, to supply the essential vitamins (A, B₁, B₂, C) and mineral salts. The outer green leaves are richer in vitamin A than the inner leaves. Our country produces quite a lot of vegetables, but, unfortunately, the consumption is not as good as one would like it to be. This is probably due to certain prejudices against certain vegetables, e.g., garlic, tomatoes, brinjals, etc. Green vegetables are essential for health. The intake of green leafy vegetables should not be less than 4 oz. per head per day. The cheaper varieties—amaranth leaves, coriander leaves, drumstick leaves, etc., are just as nutritious as the more expensive ones. A more comprehensive knowledge of vegetables, their values and uses, will help in promoting an increased consumption. An attempt should be made to consume daily a certain amount of raw vegetables, like lettuce, parsley, tomatoes, carrots, to get the best nutritive value.

Uses of vegetables.—

- (1) They maintain health and strength.
- (2) They strengthen resistance to illness.
- (3) They build solid bones and teeth in children.
- (4) They prevent constipation.
- (5) They help to maintain acid-alkali balance.

CABBAGE AND CAULIFLOWER

Deficiency of calcium is one of the greatest defects of Indian diets. The calcium content of cabbage leaves is about 90 mg. per 100 gm., and the calcium content of cauliflower is about $\frac{1}{3}$ of this amount. Both cabbage and cauliflower supply a significant amount of phosphorus and some iron. They also contain vitamins A and C. In addition, they supply roughage to the intestine and prevent constipation.

PARSLEY (AJMOOD)

Parsley is a real treasure store of vitamins and minerals. Use it freely, chopped, and mixed with mashed potatoes. It can be sprinkled on cooked vegetables.

YEAST.—The principal deficiency of Indian diet is lack of high-grade proteins and vitamins of the B group. Both of these are present in food yeast. It is extremely useful for vegetarians, and is cheap as compared with animal proteins. Some firms are now trying to manufacture yeast in India.

Uses.—

- (1) Corrects many serious deficiencies in tropical diet.
- (2) Is of essential value in the diets of the expectant mother, children, and of the aged.
- (3) Cures and prevents vitamin B deficiency as it is a rich source of vitamins of the B group.
- (4) Enhances the value of proteins already present in our diet.
- (5) Supplies essential constituents of diet in concentrated form.
- (6) Useful in treatment of malnutrition and deficiency.

CARROTS

Carrots are good sources of vitamins A and C. They also contain some vitamin B. Fresh from the garden, they are good sources of vitamin C, but partly lose it unless kept cool and moist. During cooking the loss is confined to the water-soluble vitamins (B and C), particularly when a considerable quantity of water is used in cooking. Carrots should be steamed or cooked with a small amount of water; preferably carrots should be eaten raw.

AMLA

This is a very cheap and common fruit, and a very rich source of vitamin C. The fresh juice contains about twenty times as much vitamin C as orange juice. A single fruit is equivalent in vitamin C content to two oranges.

SUGAR-CANE JUICE

This should be given a high place among the many drinks that one enjoys.

Composition.—It contains more than 18% of natural sugar and vitamins B and C. It is especially rich in organic salts and calcium, iron, etc., which are rather sparse in other drinks.

COOKING OF VEGETABLES

Add a little salt to water, and boil. Add vegetables to this small quantity of boiling salted water. Boil for the shortest necessary time, and use as little water as possible. The salt should be added to the water before cooking to lessen the amount of destruction of vitamin C. This vitamin is soluble in water, and is destroyed by heating. This destruction depends upon the length and severity of heating. Vitamin C is found to diminish if the cooked food is left standing.

The following hints regarding vegetables will be found useful.

- (1) Do not waste vegetables by excessive peeling.
- (2) Do not allow vegetables to become stale. Vegetables should be used as fresh as possible.
- (3) Do not allow vegetables to be crushed or damaged during handling or transport.
- (4) Chop vegetables for salad as short a time before serving as possible.
- (5) Cook vegetables correctly, thus obtaining the best nutritive value out of them.
- (6) Eat vegetables in plenty and get health and strength in plenty.
- (7) Eat raw vegetables, because their vitamin and mineral content is intact.
- (8) Green vegetables are rich in cellulose, and leave a good deal of residue, which stimulates the intestinal action, and is of great value in chronic constipation.

FRUIT

Fruits which afford the most nutriment are bananas, dates, figs, grapes, mangoes, etc. This is largely due to the high percentage of sugar they contain. Certain fruits are extremely rich in vitamin C and mineral salts, e.g., apples, oranges, lemons, tomatoes, guava, etc. Pineapple and papaya help in the digestion of proteins. Juices of fresh fruit contain an abundance of antiscorbutic properties. Fruit has laxative properties due to the stimulating effect of the cellulose and also of the fruit acids on intestinal peristalsis.

Papaya.—This fruit deserves greater attention than it has received. It is a cheap source of vitamins A and C and salts. It grows all the year round and is comparatively inexpensive.

Guava.—It is a cheap, nutritious fruit, and a good source of vitamin C.

ANIMAL FOODS

Food values of some of the common foodstuffs in daily use are given below.

Eggs.—Eggs are rich in essential nutritive substances. The proteins are of high biological value. The fat is finely emulsified and, hence,

easily assimilated. Minerals and vitamins are present in the yolk. Eggs have a high nutritive value, and are especially useful for growing children and convalescents.

Fish.—Fish contains proteins of high biological value. Fat content is low except in a few species like salmon and herring. It is a rich source of vitamins A and D. It is the best source of iodine, and also contains a certain amount of calcium.

Meat.—Meat contains protein of a high biological value. Fat varies in amount in different types of meat. Meat contains an appreciable amount of vitamin B, but only traces of vitamins A and C. It is rich in phosphorus but poor in calcium. Liver and other organs are a rich source of iron, and possess a higher vitamin content.

MILK AND MILK PRODUCTS

These are body-builders, and form part of the "protective foods". As such these should be included in the daily diet in some form or other.

Milk is an ideal food and contains all the proximate principles of a well-balanced diet. It contains proteins, fat, carbohydrates and salts. Proteins in milk are of the highest biological value essential for health, and of special value to vegetarians. It is, therefore, a valuable supplement to a diet mainly composed of cereals. Fat is present as an emulsion of very fine droplets which render milk easily digestible. Milk is rich in minerals, chiefly calcium, phosphorus, potassium and sodium. It has a low iron content, but all of it is in an available form. Milk contains all the vitamins. Expectant and nursing mothers and growing children have a prior claim where milk consumption is concerned. Milk should always be consumed as whole milk, and what is left over should be converted into butter, curd (dahi), butter-milk (lassi), ghee and cheese. Milk should be boiled in iron pans.

Butter is of great food value. It contains vitamins A and D. Butter is the most easily digested of all fats.

Ghee is clarified butter, and largely used in place of butter in India. It contains vitamins A and D. It has better keeping qualities than butter.

Cheese consists of coagulated casein (chhana) with certain proportions of fat, mineral salts and water. It is a cheap form of animal food of high nutritive value, and a valuable substitute for meat. Cheese is a rich source of vitamin A, and is highly nutritious.

Skimmed Milk.—Drink skimmed milk if you cannot afford pure milk. Skimmed milk retains 55% of the energy of whole milk in the form of proteins, sugar and salts. It is a useful body builder, and promotes growth. It is also cheap. It contains all the essential nutrients present in whole milk except fat and vitamins A and D.

Curd (dahi) is more easily digested than raw or boiled milk. It is an important food in this country, and has a high nutritive value.

It contains:

- (1) All the fats of the whole milk.
- (2) Vitamins A and D.
- (3) Proteins.
- (4) Salts of calcium and phosphorus.

It can be kept longer than milk.

It is less liable to contamination than milk.

Butter-milk (lassi) contains proteins and salts and is very nutritious.

PROTECTIVE FOODS

Foodstuffs rich in vitamins and minerals are known as "protective foods" because they protect against deficiency. They protect against bodily weakness and disease, and provide strength. They help not only to build up health, but to maintain it as well. Expectant and nursing mothers and growing children have a prior claim for protective foods. They protect infants against early mortality.

Important examples of these are milk, eggs, meat, fish, fruit, fresh vegetables, especially of the green leafy type. A detailed description of these foodstuffs has already been given.

A summary of foods is given in the following Table.

Body building foods (a)	Protective foods (b)	Foods for energy (c)
CLASS A	VITAMIN A	Milk, fats (butter, ghee) Vegetable oils Cooking fat Sugar, jam, honey, gur
Milk, cheese, eggs, fish, meat, liver	Milk, butter, cheese, ghee Green and leafy vegetables Eggs, oily fish, liver Carrots	
CLASS B	VITAMIN B	STARCHES
Pulses (dals, gram, lentils, masoor)	All grains of cereals and pulses, peas, beans, lentils (masoor) Wheat, ata, bread, liver, yeast, milk	Cereals (wheat, rice, bajra, jowar, etc.)
Nuts (groundnuts, almonds, cashew nuts, etc.) Peas, beans (fresh or dried)	VITAMIN C	
<i>Note</i> — Those under class B should be eaten with some of class A	Green leafy vegetables Root vegetables Potatoes, citrus fruits Sprouted pulses	

DIETS

The present day diet of the rich as well as of the poor is found to be defective, or *unbalanced*, as regards some of the essential food factors; and, therefore, both suffer, though in a different way. Between optimal health and frank ill-health, there is a considerable "no man's land" in which people may not be suffering from any

obvious disease, and yet may not be enjoying that standard of health and vigour which an optimal diet could have afforded them.

Malnutrition is responsible for widespread impairment of human efficiency, and for an enormous amount of ill-health and disease. A well-balanced diet, therefore, has a far reaching influence upon the development of the individual and the race. The power to work and resist disease depends upon an adequacy of nutrition. We have attained a fair amount of knowledge by our previous lectures, and are now in a position to plan a balanced diet.

A balanced diet should comply with the following specifications.

- (a) It must supply adequate heat and energy (calories).
- (b) It must contain all the nutritive essentials (proteins, fats, carbohydrates, vitamins and mineral salts in adequate amounts).
- (c) It should contain easily obtainable foodstuffs.
- (d) It should conform to custom, whether of family, community or race.

These specifications permit a wide range of choice. The maintenance of the body in a healthy condition depends upon a diet consisting of all the essential food factors explained before. A well-balanced diet is essential for growth and normal development.

NUTRITIONAL REQUIREMENTS OF A DIET

The energy requirement.—Calories (heat units) come first. A calorie is the amount of energy involved in raising one kilogramme (seer) of water one degree centigrade. The need for the fuel to produce heat, maintain muscle work, and support other forms of energy must be satisfied. The requirement of calories varies according to the energy consumed, i.e., a person doing hard, manual labour needs more than an office worker; a sportsman and an athlete need more than a student who finds pleasure in only reading books. The carbohydrates and fats in the diet supply this energy requirement.

(b) *The maintenance requirements.*—This is supplied by the proteins, vitamins, and mineral salts. A sufficient intake of proteins of high nutritive value is essential. The vitamins and salts should be suitably included in the diet. As such, a reasonable quantity of fruit and green vegetables, particularly leafy ones, must be provided in the menu. Fruit and vegetables also contribute the roughage essential for normal bowel function.

FACTORS INFLUENCING DIET

Habit.—It is a mistake to permit fads to go unchallenged or faulty dietary habits to persist. The person who never touches any particular foodstuff, or who cannot drink milk, or one who never has breakfast, requires *education and discipline*. Many people who say they cannot drink milk, really mean they do not like it. Family and racial custom in diet should always be considered.

State of the markets.—The state of the market, and the availability of foods, must be taken into consideration when planning the diet.

Economic status.—Economic status has to be taken into account always. To arrange a balanced diet on a limited budget is extremely difficult. It can be done, but requires knowledge of the supply of alternative available foodstuffs and their values.

Selecting a menu.—Menus should be well balanced and varied to avoid monotony. Meals must be decently cooked and neatly served.

NUTRITION IN PREGNANCY.—Pregnancy is a major problem in nutrition. The ability to reproduce depends upon physical fitness; this, in turn, depends largely upon adequate nutrition. The pregnant woman has increased nutritional demands due to the increased growth of her body and the need to supply the foetus.

Recent studies show that adequately nourished women have fewer complications in pregnancy and labour than inadequately nourished women. The healthiness of their babies has likewise been strikingly superior to that of babies born to women on a poor diet. The number of maternal deaths due to anaemia in India is appalling. There is also a high proportion of vitamin B deficiency of a fatal nature among mothers. The nutritive requirements of a pregnant woman must be estimated on a basis of her nutritive status, weight, stage of pregnancy and daily activity. It should also afford a reserve for the period of lactation. As such, pregnant and nursing mothers should have a diet which contains an adequate amount of protective foods, proteins, minerals, especially iron and calcium, and vitamins. A high protein intake is essential for the pregnant woman.

Education in nutrition should be conducted as a routine in all Maternity and Child Welfare Centres, as a part of the ante-natal clinics. It should be remembered that not only must dietary deficiencies be corrected, but the increasing nutritional demands of advancing pregnancy must also be met. This would result in improved maternal health and lowered maternal mortality; it would bring about marked improvement in child health. A pregnant woman requires at least 2,600 calories per day.

NUTRITION FOR NURSING MOTHERS.—Preparation for lactation should begin as soon as pregnancy is diagnosed. An increased protein ration is essential during pregnancy to promote lactation. The child gets its proteins and other nutritive essentials from the mother's milk. The proteins in the diet of the nursing mother should be of the highest possible biological value and should be in the form of milk, eggs, fish and meat. The demand of the infant for both vitamins A and B complex is higher than that for other vitamins. As such the mother's diet should contain an excess of these for supply to the infant in breast milk. Vitamins C and D are scanty in breast milk; these should be given to the infant early in life in the form of cod-liver oil and orange juice. During the period of nursing a mother needs a balanced diet of higher caloric value than during pregnancy; she requires 3,000 calories per day.

NUTRITION IN INFANTS AND CHILDREN.—Nutritional problems of this group are quite different from those affecting grown-ups. Continual growth and development require an adequate

increase in diet. Proteins must be supplied for the building of tissues, iron for the haemoglobin of the blood, and calcium and phosphorus for bone growth and better teeth. Calcium is also essential for the proper functioning of the nervous system. Carbohydrates are the principal source of energy for the infant and the child. An adequate amount of vitamins is also an essential part of diet. *Human milk* furnishes practically all the nutrients required by the infant. Gastro-intestinal disturbances are less frequent in breast-fed babies, because the milk as it comes from the breast is free from harmful bacteria. It is easily digested and is also cheap. The mother's state of health and nutrition must be maintained during the period of lactation—she needs a larger amount of food to supply the additional calories in her milk for the infant. If a child is to get a good start in life its mother must be properly nourished, and it must itself receive a satisfactory diet during infancy and early childhood.

Malnutrition is more prevalent among artificially-fed infants than amongst the breast fed. Improper feeding, and under feeding, are the chief causes. Poor hygienic environment is an important predisposing factor; but malnutrition is by no means limited to poor people. Breast feeding should be encouraged to avoid many of the minor nutritional disturbances during infancy.

Weaning.—Breast feeding has no advantage beyond the age of nine months. Some suggest that weaning is advisable even earlier, say from the seventh month. The reason is that breast milk contains less proteins than cow's milk. It is better to introduce some semi-solids like suji, cooked in water and mixed with a little cow's milk, and mashed baked potatoes also mixed with cow's milk, from six months. The infant should be weaned gradually. Each breast feed should be substituted by other foods till by the end of nine months or a year the child is completely weaned. Weaning should not be started during the summer months or while the infant is ill.

Some hints about the feeding of healthy children.

- (1) From the age of two a child should be permitted to feed himself.
- (2) Serve small quantities; and add more, if desired.
- (3) Do not force the child to eat what he does not like.
- (4) Over-solicitation often causes loss of appetite.
- (5) It is quite normal for a child to eat a small amount at one meal and twice that amount at the second meal.
- (6) Do not scold the child at meal times; this interferes with digestion and appetite.

Long interval between meals.—There is one grave defect in the dietary of students and clerical staff. This is, that they allow a very long interval between their morning and evening meals. They take their morning meal at about 9 a.m. and nearly 9 hours or more elapse before they have their evening meal. They are engaged in active duty all this time, and require adequate food for maintaining heat and energy. They may take tea, and light refreshment, during

recess or lunch hour, or about tea-time, but this is quite inadequate. To permit this chronic starvation to persist month after month is to impair growth and lessen resistance to infection. This is most injurious, particularly at a period when children are growing into adults. It is suggested that a hot, cheap, balanced meal be provided for this class of the population. I personally feel that school children should be given, free, a hot cup of milk, a couple of biscuits and a piece of fruit (orange, banana, mango, etc.) during the recess period.

NUTRITION IN RELATION TO TEETH

Importance of efficient nutrition to dental health.

A deficient diet means bad teeth; bad teeth mean bad health.

A sound set of teeth is essential for mastication and for general health. Mastication cleans the teeth and stimulates the dental blood supply. Inadequate mastication (chewing) or a septic focus in the teeth will neutralize the nutritive value of a correct type of diet. It is an accepted fact that a sufficient amount of vitamin D and calcium are effective in reducing and preventing dental caries. Nutritional treatment of some oral diseases like tooth decay (dental caries) and pyorrhoea is increasingly being recognized. Malnutrition, and particularly vitamin and mineral deficiency, is the chief cause of these oral diseases.

Any disease due to a nutritional deficiency (rickets, etc.) occurring during the formation of the teeth may result in their improper development and predispose them to caries (decay). Dental caries is common among children. To help them develop healthy teeth, and to prevent caries, a well-balanced diet is essential. It should contain milk, eggs, leafy and root vegetables, some fruit (an orange or a tomato), cereals, potatoes and fats in sufficient amounts to meet the full calorie requirements. Care should be taken that at least a third of the calories required should be in the form of protective foods.

NUTRITION IN OCCUPATION.—To protect and improve the nutritional status and health of the worker we must know his present state of nutrition and the amount of energy that will be consumed during the course of his occupation. After this we can proceed to devise a balanced diet that will give the worker an adequate energy requirement (calories) essential to maintain his health and efficiency. A person doing hard physical work needs a large amount of proteins to make up for the wear and tear of the tissues. He also requires carbohydrates and more fat, because a meal lacking in fat is deficient in staying power. The diets suggested in this booklet are based on these considerations.

NUTRITION FOR THE AGED

Factors influencing the nutrition.

- (1) Loss of teeth, badly-fitting dentures and false teeth cause blisters in the mouth, and thus interfere with proper mastication leading to indigestion.

- (2) Diminution in the secretion of the digestive juices.
- (3) Atrophic changes in the mucosa of the gastro-intestinal system often lead to constipation or diarrhoea. Elderly persons may attribute this to certain foods they may have consumed.
- (4) Food fads—there have developed over the years certain tastes and ideas about various foods, which are difficult to eradicate.

Food requirements.—The caloric requirements of old persons are not so great as those of the young. However, the old should receive sufficient calories to retain their normal weight. They should take a fair amount of protein during the course of the day to maintain the nitrogen balance. The amount varies according to the physical condition of the aged. It is suggested that most of the protein should come from meat, liver, fish, eggs and milk. Carbohydrates furnish the bulk of the nourishment of old people, but they should not be consumed in excess. The carbohydrates should be of high mineral and vitamin content. The diet should contain whole wheat atta, rice (not too highly polished), vegetables (lightly cooked), and fruit. It is not advisable for old persons to have too much fried food; a diet rich in fat is likely to upset their digestion. Milk is a very good food, as it is easily digestible. Foods rich in iron are indicated in the dietary of old persons, e.g., liver, meat, leafy vegetables etc. Plenty of fluids also should be taken. In short, the difficult problem of nourishing the aged can be solved by a proper selection of foods and improvement in dietary habits.

HOW FOOD IS WASTED.—In these days, when food is not available in abundance and the cost is high as compared to pre-war levels, it is a crime to waste food. Every effort must be made to get the best and the maximal value from food.

1. *Cereals* lose their nutritive value by milling and polishing. When rice is milled it loses the outer layers (the germ and pericarp). These contain more protein, mineral salts and vitamins than the starchy inner parts of the grain (endosperm). Popular prejudice in favour of highly-milled rice has persisted by a natural, but misleading, association of ideas—whiteness and cleanliness; nevertheless, scientific research has shown that undermilled rice possesses solid virtues. Rice from which only the husk has been removed, and from which most of the protein and vitamin have not been polished away, is digestible, assimilable and palatable, and more nutritive than polished rice.

2. *By excessive cooking, and by cooking in open vessels.*—Ordinary cooking causes little loss of proteins, fats and carbohydrates in cereals, pulses and meat. In the case of vegetables some protein is lost on boiling, particularly when salt is used in cooking. There is considerable loss of minerals and vitamins of the B group when foods are washed and cooked. Frying does not lead to much change in the nutritive value of foodstuffs. Food should be cooked properly in closed vessels.

3. *By using baking powder.*—This promotes vitamin destruction.

4. *By throwing away the water in which rice or vegetables have been*

cooked.—This water contains nutritive values. Water sufficient for cooking should be added so that no surplus water is left. Only a very little water should be added in the cooking of vegetables, the reason being that vegetables themselves contain a high percentage of water.

5. *By excessive peeling and removing edible skin and rind.*—This means throwing away the essential parts that contain vitamins and roughage which are necessary to counteract constipation.

6. *By the depredation of rodents and insects.*—Rodents are responsible for the damage to over a million tons of food grains annually, and a similar amount is lost due to the action of insects and bad storage. Immediate action should be taken to prevent, or at least minimize, this loss; this will result in a great contribution to the food supply of our country.

CAMPAIGN FOR BETTER FOOD

1. A nutrition campaign has to be accompanied by a more vigorous campaign for more and better food and for increasing the production of foodstuffs, particularly of protective foods. Everyone knows what they eat and how they eat, but few know what they should eat and how they should eat it. People have not only to be told what to eat and how to eat, but how to produce more and better food. All this means education.

2. Irrigation development is vital to the relief of our food scarcity. Well-planned irrigation means improved agriculture, and more so if proper seeds and fertilisers are used. A well-planned irrigation system means providing water in the right place, at the right time and in the right quantity. All this will yield more and better food grains. Farm machinery is also essential for this campaign.

3. *Animal husbandry.*—For the production of more protective foods we must pay special attention to this section of the campaign. We must improve the condition of our cattle. This means the selection of high-yielding cows and buffaloes, and scientific feeding and breeding of cattle. Poultry farms need considerable improvements for the production of more eggs, hatchability and better growth of the birds. In fact, the condition of all animals used for food calls for adequate scientific attention with regard to feeding and breeding.

4. *Fisheries.*—We get our food from land and aquatic (water) sources. The former comprises agriculture and animal husbandry which has been discussed above; the other is fisheries. Food from land sources is deficient in certain essential factors. It is an admitted fact that these deficiencies can be remedied by foods from aquatic sources since these contain almost all the essential nutritional factors, such as proteins, vitamins and minerals. As such it is essential that fisheries be developed and improved on a scientific basis.

5. *Transport and distribution.*—Increased production of food must be accompanied by improved methods of storage, transport and distribution. Transport for quick distribution, and of the type to prevent deterioration of foods in transport is essential. The bot

climate and long distances in our country demand special efforts, and planning, to preserve foodstuffs till they reach the consumer.

6. *Research*.—This must be carried on to find better and more suitable methods for greater production. It is only by carrying out experiments in the laboratory and field that one gains better knowledge.

GROW MORE FOOD.—Growing more food is a healthy outdoor hobby. All institutions, such as schools, colleges, hospitals, etc., and people living in bungalows should attempt to grow vegetables for their own use. You can help yourself and others by growing your own food on your spare plot, thus relieving the demand on the markets. The importance of the education of the public in this aspect cannot be too strongly stressed. Instruction about nutrition, and growing more food should be included in all adult educational courses. The Emergency School Food Production Campaign launched by the Ceylon Government in July, 1943, for additional foodstuffs proved most useful. Each rural school had a garden which was cultivated by the children. We can follow the same scheme and cultivate plots in each of the rural and urban schools. This will also give an incentive to the pupils to start a garden plot in their parents' home if some spare land should be available.

BALANCED DIETS

Diet for the expectant mother

Wheat	10 oz.
Rice or other cereals	4 oz.
Pulses	3 oz.
Non-leafy vegetables (Brinjals, pumpkin, gourd, ladies fingers, vegetable marrow, colocasia, potatoes, carrots, etc.)	6 oz.
Leafy vegetables (amaranth and drumstick leaves, sarson and channa-ka-sag, palak, cabbage, etc.)	4 oz.
Ghee or cooking oil	2 oz.
Milk	16 oz.
Sugar or gur	2 oz.
Fruit	2 oz.
Condiments	To taste
Drink plenty of water	

NOTE.—If you have more money, increase the quantity of milk to 20 oz. Non-vegetarians can supplement the above diet by addition of one egg and two ounces of meat on alternate days.

Diet for the nursing mother

Wheat	10 oz.
Rice or other cereals	4 oz.
Pulses	3 oz.
Non-leafy vegetables	6 oz.
Green leafy vegetables	4 oz.
Ghee or cooking oil	2 oz.
Milk	24 oz.
Sugar or gur	2 oz.
Fruit and nuts	4 oz.
Egg	1
Meat or fish	2 oz.
Condiments	To taste
Drink plenty of water	

NOTE.—Vegetarians can substitute 4 oz. of milk and 2 oz. of extra fruit in place of an egg, meat or fish.

Specimen balanced diets for children of various ages

Age	Constituents of diet					
2 to 3 years	Milk	30 oz.				
	Sugar or gur	2 oz.				
	Vegetables	2 oz.				
	Cereals	1 oz.				
	Fruit juices	1 oz.				
	1 egg on alternate days					
3 to 4 years	Milk	30 oz.				
	Sugar or gur	2 oz.				
	Vegetables	3 oz.				
	Cereals	2 oz.				
	Fruits	2 oz.				
	1 egg on alternate days					
5 to 7 years.	Cereals	4 oz.				
	Milk	24 oz.				
	Sugar or gur	2 oz.				
	Vegetables	5 oz.				
	Fruits	2 oz.				
	1 egg daily					
8 to 12 years	Ghee or butter or vegetable oil	$\frac{1}{2}$ oz.				
	Cereals	6-10 oz.				
	Milk	16 oz.				
	Pulses	1 oz.				
	Leafy vegetables	2 oz.				
	Other vegetables	4 oz.				
12 to 14 years	Fruit	3 oz.				
	Butter	1 oz.				
	Ghee or vegetable oil	$\frac{1}{2}$ oz.				
	Sugar or gur	2 oz.				
	Cereals (wheat or rice)	10-12 oz.				
	Pulses	2 oz.				
	Leafy vegetables	2 oz.				
	Non-leafy vegetables	6 oz.				
	Raw vegetables	2 oz.				
	Butter	$\frac{1}{2}$ oz.				
	Ghee or cooking oil	1 oz.				
	Milk	16 oz.				
	Sugar or gur	2 oz.				
	Meat or fish	2 oz.				
	Fruits	4 oz.				

1 CHEAP DIET FOR INDOOR WORKER

Wheat flour	10 oz.	
Other cereals	6 oz.	(makai, rice, bajra, cholam, etc.)
Pulses	2 oz.	(red gram, lentil, etc.)
Leafy vegetables	3 oz.	(any kind of cheaper sags)
Other vegetables	6 oz.	(cheaper stuff, e.g. tori, desi tori, arui, kadam soothney, brinjal, etc., and potatoes whenever cheap)
Vegetable oil	1 oz.	
Puffed rice		
Roasted gram		
Sprouted gram		
Roasted maize	2 oz.	

1. CHEAP DIET FOR INDOOR WORKER—continued.

Gur	..	..	2 oz.
Fruit	..	..	4 oz.
Butter-milk	..	..	8 oz.
Condiments	..	..	1 oz.

Remarks.—The total calorific value comes to about 2,700 per day. For all practical purposes the consumption of fruits would be nil and as such they have been left out of calculation. This diet suggests one pice worth of fruit every fourth day.

2. DIET FOR INDOOR WORKER (MODERATE WORK)

Wheat flour	.	..	10 oz.
Rice	..	..	4 oz.
Pulses	..	.	3 oz. (Bengal gram, red gram or lentil, etc.)
Leafy vegetables	..	.	3 oz. (all kinds of sags including cabbage)
Other vegetables	.	.	6 oz. (potatoes, arwal, cauliflower, ladies fingers, tomatoes, carrots, beetroot, turnips, etc.)
Vegetable oil	.	.	1 oz.
Ghee	.	..	1 oz.
Fruit	..	.	4 oz. (bananas, mangoes, papaya, guava, kharbuza, etc.)
Gur	..	..	3 oz.
Milk or	..	..	12 oz.
Flesh foods	..	..	3 oz.
Condiments	..	..	1 oz.

Remarks.—Total daily yield of calories almost 3,000. The non-vegetarian may substitute a part or whole of the milk with flesh if they so desire, but it should be remembered that as body-building food (specially needed by children, nursing mothers and pregnant women) milk is a superior article of diet as compared with flesh foods. In choosing meat for the menu lean meat (with least amount of fat) should be preferred.

3. CHEAP DIET FOR LABOURER (MODERATE MANUAL WORK)

Wheat flour	.	..	12 oz.
Rice	..	..	4 oz. (bajra, other cereals)
Pulses	..	..	2 oz.
Puffed rice	}	..	4 oz. (for breakfast and afternoon snacks)
Roasted gram			
Sprouted gram	}	..	4 oz. (for breakfast and afternoon snacks)
Leafy vegetables			
Other vegetables	..	.	3 oz. (all kinds of sags)
	..	.	6 oz. (potatoes, carrots, cabbage, ladies fingers, brinjals, gourd, etc.)
Vegetable oil	.	.	1 oz.
Fruit and condiments	..	2-4 oz.	(minced onion, tomato, radish, cucumber, carrots, green chillies, etc., preferably soaked in fresh lime juice and fruits like mango, jackfruits, jamun, guava, etc., when available and cheap)
Milk	..	..	8 oz.
Meat or fish	..	..	4 oz. (this depends upon whether the consumer is a vegetarian or not. If milk be very dear then intake of dahi or even skimmed milk is advocated)
Gur	..	..	2 oz.
Condiments	..	..	1 oz.

Remarks.—The total calorific value comes to about 3,300. Jaggery or gur has been suggested to be consumed with chapati or else with tea if the consumer be addicted to the beverage.

4. CHEAP DIET FOR LABOURER (AGRICULTURAL)

Wheat flour	..	..	12 oz.
Other cereals	..	..	6 oz. (rice, millet, maka, jowar, etc.)
Pulses	..	..	2 oz. (red gram, lentil, etc.) (arhar)
Puffed rice	}	..	4 oz. (mainly used as breakfast and afternoon snacks)
Roasted gram			
Sprouted gram			
Leafy vegetables	..	..	4 oz. (amaranth, tharia, bathua and other sags. Also khalo, and gram sag consumed raw during winter season)
Other vegetables	..	..	6 oz. (brinjal, gourd, pumpkin, ladies fingers, calocacia, potato when comparatively cheap, vegetable marrow, etc.)
Vegetable oil	..	..	1 oz. (generally mustard oil, but no objection to til, mahua oil)
Fruit	..	..	4 oz. (kakri, kharbura, guava, jamun, mango, papaya, etc.)
Butter-milk	..	..	8 oz. (lassi from skimmed milk or dahi)
Gur	..	..	1 oz.
Condiments	..	..	2 oz.

Remarks.—The caloric value of this diet comes to about 3,000. As this diet has been suggested mainly for rural areas it has been presumed that the consumer maintains a modest kitchen garden. Butter-milk when available increases the qualitative value of the food without any appreciable increase in the calories.

5. IMPROVED DIET FOR TECHNICAL LABOURER (HARD MANUAL WORK)

Wheat flour	..	..	..	..	10 oz.
Rice	..	..	..	..	4 oz.
Other cereals	..	..	..	..	2 oz.
Pulses	..	..	..	..	3 oz.
Leafy vegetables	..	..	..	..	2 oz.
Non-leafy vegetables	..	..	..	..	8 oz.
Vegetable oil	..	..	..	..	1 oz.
Ghee	..	..	..	..	1 oz.
Milk	..	..	..	..	16 oz.
Fruit	..	..	..	..	4 oz.
Condiments including raw vegetables, sliced onion, tomato, cucumber, etc.)	..	..	..	..	4 oz.
Sugar or gur	..	..	..	..	3 oz.

Remarks.—The food value comes to about 3,500 calories per day. Non-vegetarians may substitute 3 oz. of meat and 10 oz. of milk in place of 16 oz. milk.

6. COMPOSITION OF A BALANCED DIET

Recommended by Nutrition Advisory Committee I.R.F.A.
(Adequate for the maintenance of good health)

Cereals	..	..	..	..	14 oz.
Pulses	..	..	..	..	3 oz.
Green leafy vegetables	..	..	..	..	4 oz.
Root vegetables	..	..	..	..	3 oz.
Other vegetables	..	..	..	..	3 oz.
Milk	..	..	..	..	10 oz.
Fruit	..	..	..	..	3 oz.
Sugar or jaggery	..	..	..	..	2 oz.
Vegetable oil, ghee, etc.	..	..	..	..	2 oz.
* Fish and meat	..	..	..	..	3 oz.
{ Egg	..	..	..	..	1

* Replace flesh food with extra 4 oz. milk.
Total calories value 2,800 per day.

(N.B.—Other cereals mean rice, makkai, bajra, cholam, etc.)

Rice eaters can reverse the proportion between other cereals. A mixed diet of wheat and other cereals is preferable to a diet of other cereals alone.

If one cannot afford whole milk it is best to use skimmed milk.

AUSTERITY MEALS
DIET FOR A NORTH INDIAN FAMILY
 (Man, wife and two children (aged 8 and 4))
(LOW COST)

	Quantity per day
Wheat	1 seer 11 ch.
Dal (chana, arhar, etc.) .. .	3 ch.
Leafy vegetables (palak, sarson, sag, etc.)	4 ch.
Other vegetables (radish, pumpkin, marrow, green chillies, etc.) .. .	3 ch.
Oil or vanaspati .. .	1 ch.
Condiments (salt, chillies, etc.)	½ ch.
Sugar or jaggery (gur) . . .	½ ch.
Butter-milk (lassi) .. .	1 seer

(N.B.—Non-vegetarians may take 4 chhattacks of meat once a week and vegetarians can take a seer of extra milk instead. Cheap seasonal fruits, e.g., amla, ber, etc., should be taken whenever possible.)

The food value comes to 2,390 calories per adult per day

DIET FOR A NORTH INDIAN FAMILY
 (Man, wife and three children (ages 10, 7 and 4))
(MODERATE COST)

	Quantity per day
Wheat	1 seer 8 ch.
Rice .. .	3 ch.
Dal (urd, mung, chana, etc.) . . .	5 ch.
Milk .. .	10 ch.
Leafy vegetables (cabbages, salad, etc.)	7 ch.
Other vegetables (cauliflower, beans, brinjal, etc.)	10 ch.
Fruit (guava, banana, etc.) . . .	3 ch.
Oil or vanaspati .. .	3 ch.
Condiments (salt, chillies, etc.)	2 ch.
Sugar	2 ch.

(N.B.—Non-vegetarians may take 6 chhattacks of meat or fish once or twice a week and vegetarians can spend the same amount on extra milk.)

The food value comes to 2,510 calories per adult per day

**ARTICLES OF INDIAN DIET AND METHODS OF
THEIR PREPARATION**

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PREPARATIONS FROM RICE

Rice can be prepared in the following ways.

- | | |
|---------------------|-------------------------|
| (1) Chawal or Bhat. | (5) Curd or Dahi Kheer. |
| (2) Khichri. | (6) Pulaw. |
| (3) Milk Kheer. | (7) Zarda. |
| (4) Feerni. | |

Moorhi is baked rice, Chnra is wet rice beaten flat and dried, and Chal Bhaja is parched rice. Kanji is the water in which rice has been boiled.

(1) **CHAWAL OR BHAT.**—This is plain boiled rice, with the water drained off. It is the very common article of diet in India. Mixture of Bhat and milk, or Bhat and Dal Mnong, is advised in all the diseases where light food is necessary.

(2) **KHICHRI.**—This is rice mixed with dal of various kinds, and is prepared in two different ways.

- (a) **KHICHRI MOONG.**—Take equal quantities of rice and moong dal, wash in water, place in a vessel with sufficient water to cook the rice well, and add salt, saffron, pepper, and big ground cardamoms to flavour. When the water has evaporated, and the khichri is cooked, add the required amount of ghee, and keep it on a slow fire for about half an hour. This khichri is a light food and is advised after purgatives, and in all the diseases where light and nutritive food is necessary.
- (b) **KHICHRI URAD** (any other kind of dal can be used, but urad has the best taste).—Take rice and urad dal equal parts and wash in water; in a vessel place ghee with browned sliced onion, ground saffron, pepper, green coriander leaves and big cardamoms; to this add the rice and dal and, finally, salt. Then cook. This khichri, being difficult to digest, is not considered suitable for patients.
- (3) **CURD OR DAHI KHEER.**—There are two ways of preparing this.
- (a) Mix the raw rice (washed) in dahi, with a little salt and powdered saffron; boil these until the rice is well cooked. It is served in a semi-solid state, and is a very useful diet for diarrhoea and dysentery cases when solid food is being commenced.
- (b) Take some ghee in a vessel and fry a little zeera, then add saffron and ground pepper and after this the rice. Fry these for five minutes then add equal parts of dahi and water, sufficient only to cook the rice; finally flavour with salt. It is served in a semi-solid form. This is not suitable for patients but can be given to convalescents.
- (4) **FEERNI.**—Take two chittaks of powdered rice; mix with one seer of milk. While cooking, stir well, and when partly cooked add kishmish, in small particles, and four chittacks of sugar. Serve in earthen plates. It is easily digested. Given in diarrhoea, dysentery and convalescent cases.
- (5) **MILK KHEER.**—This is prepared by boiling rice in milk, adding sugar and dried fruit, such as almonds, raisins, etc. This is good for convalescents and can be given in cases in which there is no digestive trouble.
- (6) **PULAW.**—Cut up some meat in large pieces, and make soup; remove the pieces of meat from the soup. To some ghee in a vessel, add browned onion and fry with pepper, saffron and ground coriander. After this fry the meat, and finally the rice for a few minutes, then add the soup with some salt to flavour. Cook the whole on a slow fire till the soup evaporates then add more ghee, and put the degchi on a slow fire for about 15 minutes. When serving, cover with browned onion and big cardamoms. It is said to be easily digested, is nourishing and is useful for convalescent cases.
- (7) **ZARDA.**—Place sugar syrup in a degchi, boil rice with a little powdered saffron, drain the water away before the rice is quite

cooked; fry some cloves, cinnamon, cardamom seeds ground in ghee, then add the rice and syrup, and let this cook on a slow fire; dried fruit, such as almonds, raisins, etc., are also added. It must be kept constantly stirred to prevent burning. It is not easily digested, and is not suitable for invalids.

PREPARATIONS FROM WHEAT

Wheat is generally ground in the following forms.

- | | |
|----------------------------------|-----------------------------------|
| (1) Maida (flour) is the finest. | (3) Suji is coarser than atta. |
| (2) Atta is next. | (4) Dalia is the coarsest of all. |

(1) MAIDA preparation includes Puries, Kachories, Chapaties, Double Roti, Biscuits and Shirmal.

(2) ATTA preparations include Chapaties, Paratas, Puries, Kachories and Nan.

(3) SUJI preparations include Halwa, Chapaties, Paratas, Puries, Kachories, Double Roti, Biscuits and Shirmal.

(4) DALIA.—The dalia is boiled in water, milk is added, and salt or sugar according to the patient's taste. This is very nourishing and useful both for convalescent cases and patients.

CHAPATIES.—These can be made from either atta, suji or maida; the flour is mixed well with water into a thick paste, rolled out flat and thin to the size of a small plate; it is then cooked by being placed on a hot iron plate ("tawa") for about a minute for each side of the chapati; it is then removed from the "tawa" and placed on the coals until it swells up. This is a very common article of diet in India. Suji chapaties are easy of digestion and excellent for invalids. Maida chapaties must not be given, being difficult to digest.

PARATAS.—Mix a little ghee and salt with either atta, suji or maida and add sufficient water to make into a paste. Then roll the paste out on a board and fold into four layers, smearing a little ghee between each fold; then roll out to the size of a small plate and fry well in ghee or oil on a "tawa". This is a very common article of diet, but it is not easily digested; can be given to the convalescent, but is unsuitable for the sick.

PURIES (or POOREES).—These are small chapaties fried in a pan with ghee or oil. It is a very common article of diet, and, if properly fried, is often more easily digestible than chapati, as the starch granules are entirely broken up by the action of the hot ghee. It is not recommended for the sick but is generally advised for convalescents.

KACHORIES.—In this, two preparations of paste are necessary.

No. 1 is made of atta, maida or suji, in the same way as for paratas.

No. 2 is urad paste, prepared by soaking urad dal for two hours, then washing and taking off the skin, grinding into a paste, adding a little salt, chillies, saffron and coriander (leaves and seeds). Take a small ball of the atta paste, make

a hollow in it and fill with the dal paste, cover the top and roll out on a board to 3 or 4 inches diameter and fry in a hollow pan in the same way as Puries. This is a form of diet not suitable for the sick-room.

HALWA.—This is another common article of diet all over India, taken as a luxury. It is prepared from suji, rarely atta or maida. The suji is fried in ghee or oil, and sufficient milk added to make it into a thin or thick paste; sugar is added while boiling, and dried fruit after being taken off the fire. It is an excellent article of diet for medical and surgical cases.

SHIRMAL.—This is a preparation of suji or maida, mixed with milk and a little ghee, rolled out to the size of a small plate, and baked in an oven. A little sugar or salt may be added to flavour. Shirmal is a very common article of diet among Mohammedans all over India. It is not a suitable sick or convalescent diet, not being easily digested.

NAN.—This is also largely used by Mohammedans. Atta is mixed with water and salt, rolled out on a board, and baked in an oven. It is not generally recommended for the sick.

DOUBLE ROTL.—This is the Indian name for English bread. It is made by mixing maida (flour) or suji with about 60% of water, adding salt, yeast or khamir (toddy), and after kneading well is left to ferment, finally being baked in an oven. This is leavened bread as compared with chapatis, which are unleavened bread. It is an excellent article of diet for the sick, being light and easily digested.

BISCUITS.—These are becoming very popular with Indians. They are made of either maida or suji, and butter, mixed into a paste with water, and flavoured with salt or sugar, and baked in an oven. The plain lighter kinds are suitable for invalids.

PREPARATIONS FROM DAL

Preparations are made in two ways for:

- (1) The sick.
- (2) The convalescent and healthy.

(1) **FOR THE SICK.**—Boil a seer of water, then add 8 oz. of dal mixed with a little ghee, and some ground saffron, pepper and coriander. Allow this to boil for about half an hour, occasionally stirring. If the mixture is becoming too thick, and the dal grain not well cooked, more boiling water must be added. This is continued until no trace of grain is left, then salt added to flavour. If the patient is very ill, only a strained extract is given; in other cases it is well mixed into a paste and fried with a little ghee, browned onions, and garlic. Moong and moth are the only two kinds of dal which it is advisable to use in sickness.

The following preparation is very useful in acute cases when solid food is not permitted, and the patient is tired of taking (or cannot take) milk; it is an excellent substitute for mutton or chicken

broth among those Hindus who are unable to take meat in any form.

Take 1 chatak of each of the following dals, Moong, Mot Masur and Arhar. Cook as above. This can be given to patient three or four times daily, and is a very nourishing form of Rasa or Dal-soups.

(2) FOR THE CONVALESCENT AND HEALTHY.—As part of a rice or chapati-eater's diet. Boil any of the following dals, urad, arhar, gram (chana), or masur in the same way as in (1) above, but more condiments should be added, according to taste. When the dal is well cooked, vegetables may be added, such as dahi, tomatoes, dried mangoes, palack, kulfa (these must not be added to dal urad); the whole is then cooked until it is of the desired consistency; then add salt, and boil for five minutes, and remove from the fire. Finally, boil some ghee or oil in a cup, with fried onions or garlic, add this to the dal, and cover for a few minutes before eating.

Gram dal is very difficult to digest; it can be ground into attar in which form it is used in the preparation of sweets and other foods.

There are many other preparations of dal, such as barhi, moongor, papar, dalmoth and chunori. A flour of dal is used in the preparation of jalebi and laddoo.

Pish-pash in Bengal is made by cooking a mixture of rice and dal. This has the advantage that none of the nutritive properties of the rice are lost.

MILLETS

The chief are:

- | | |
|------------|--|
| (1) Jawar. | (4) Maduwa. |
| (2) Bijra. | (5) Baijar (mixture of Jau and Chana). |
| (3) Makka. | |

This is the staple food of the poorer classes. It is ground into attar and cooked as chapaties.

SWEETMEATS

These enter largely into the Indian diet. Nearly all are cooked in ghee, which renders them difficult to digest, and are therefore not generally advisable for the sick.

Sweetmeats are divided into two main classes:

- (1) SWEETMEATS PREPARED FROM KHOWA OR MAWA (i.e., milk evaporated down until almost solid), together with sugar, dried fruit, and flavouring essence, such as rose.
- (2) SWEETS PREPARED FROM VARIOUS KINDS OF GRAIN; grain fried in ghee, with sugar or salt and dried fruit.

Sweets prepared from Khowa or Mawa are: (Mawa) Laddoo, Paira, Burfee, Gulabjaman, Singori and Bal, etc.

Sweets prepared from grain-foods are subdivided into two classes:

- (a) Sweet preparations.
- (b) Salt preparations.

(a) SWEET PREPARATIONS.—(Grain) Laddoo (can be made out of moong, suji or besan), Burfee (moong), Amertee (urad), Jalebi (maida), Balusai (maida), Nonkhatai (suji), Halwa (suji), Halwa Sohan (nisasta or pure starch), Guyia (maida or dried fruit).

(b) SALT PREPARATIONS.—Khasta Kachori (without dal stuffing), Kachon (with dal), Dalmoth (dalchana or besan and dalmoth), Mathri (suji or maida), Tirkhoont (maida stuffed with vegetables such as potatoes or peas).

The following sweets are those most suitable for the sick: Halwa (suji), Burfee (moong), and Nonkhatai (suji).

The above sweets are, of course, not advisable in diabetes, hepatic disease and in intestinal dyspepsia.

The salt preparations should not be given in any form to cases of general anasarca, ascites or acute inflammations.

In Bengal, Sandesh, made of coconut, and Rasagolla, containing a high percentage of sugar, are the most nutritious and easily digested.

VEGETABLES

Vegetables are generally taken with all meals. They may be divided into three classes:

(I) Seeds or Fruit; (II) Greens; (III) Roots or Tubers.

I. SEEDS OR FRUITS

- | | |
|----------------------------------|---------------------------------------|
| (1) Beans (Phalce). | (7) Cucumber (Kakri or Khira). |
| (2) Peas (Mutter). | (8) Torai. |
| (3) Brinjal (Bhata or Baigun). | (9) Vegetable Marrow (Lauki). |
| (4) Ladies' Fingers (Bhindi). | (10) Preserved White Pumpkin (Petha). |
| (5) Pumpkin, red (Kaddoo). | (11) Tomato (Tamatar). |
| (6) Cauliflower (Gobi Ka Phool). | |

Among these, Torai, Lauki and Petha are especially useful for the sick, being easily digested. Petha is also used for preparing various kinds of sweets, such as Petha Grapes, Petha Burfi and Cakes.

METHODS OF COOKING.—Brown onion or garlic in ghee or oil, then add the vegetable, previously washed and chopped up with condiments, and fry well; add water; when well cooked add salt and dahi to flavour. These vegetables are taken either as soup, or dry, i.e., after the evaporation of the water used in the cooking. In cooking greens, if water is not added, there must be sufficient ghee or oil to fry well. For patients, the method of preparing is the same, only condiments should be added as little as possible, and no dahi.

Note.—Water must not be added in cooking ladies' fingers or bhindi.

II. GREENS

- | | |
|------------------------|--------------------------|
| (1) Spinach (Palak). | (4) Dill (Soya). |
| (2) Purslane (Kulfa). | (5) Cabbage (Band Gobi), |
| (3) Fenugreek (Methi). | etc. |

All greens are prepared in the following way.

First heat sufficient ghee or oil, then add the greens, previously chopped up and washed, cover and cook on a slow fire, giving an occasional stir to prevent burning; add salt when the water has evaporated; then the vegetables must be well fried (when the greens are not used for the sick, oil is better than ghee for frying); for the sick, greens should first be well boiled in water, then fried in ghee, as described above. Dill, Purslane and Spinach are the best for invalid's diets.

III. THE ROOTS OR TUBERS

- | | |
|---------------------|----------------------|
| (1) Carrot (Gajar). | (4) Turnip (Salgam). |
| (2) Potato (Alu). | (5) Onion (Pyaz). |
| (3) Radish (Mooli). | (6) Garlic (Lasson). |

Carrot halwa is a tasty dish and is used as a tonic. Radish, raw or cooked, is considered useful in piles and cases of jaundice. Onion is the most useful of the vegetable roots; it is considered to be aphrodisiac, and is recommended in cholera and sunstroke.

Garlic has a great reputation in tuberculosis, and is used in many forms both externally and internally. In the latter form it is given with condiments or fried as described above. Externally it is used in the form of poultices, etc., for tuberculous disease of the glands and bones, and for tuberculous sinuses.

Method of cooking these vegetables is the same as for No. I. Condiments, such as chillies, are best avoided in a sick diet or given only in small quantities.

VEGETABLE SOUP

- | | |
|--------------------------------|---------------------------|
| 2 cups potatoes (diced) | 1 cup celery with leaves, |
| 2 cups carrots (diced) | chopped |
| 2 cups green peas | 2 large red onions |
| 6 fresh tomatoes (medium size) | |

A few soya, methi and fresh sage leaves, if you have them.

Wash all vegetables well. Do not peel potatoes or carrots. Pour boiling water over the tomatoes and slip off the skins. Put all vegetables on to cook in sufficient cold water to cover well, adding the tomatoes when vegetables are tender. Cook for two hours, adding more water if necessary. Serve with pieces of vegetables or strain and add salt to taste. Serve hot.

FRUIT

The following are the kinds in common use.

- | | |
|---|----------------------------|
| (1) Apple (Sew) | (11) Orange (Narangi) |
| (2) Apricot (Khubani) | (12) Peach (Aroo) |
| (3) Banana (Kela) | (13) Pear (Nashpati) |
| (4) Figs (Anjur) | (14) Pineapple (Annanas) |
| (5) Grape (Angoor) | (15) Pomegranate (Anar) |
| (6) Guava (Amarud) | (16) Water-melon (Tarbooj) |
| (7) Lemon (Niboo) | (17) Bael (Bale) |
| (8) Loquat (Loquet) | (18) Coconut (Gola) |
| (9) Mango (Amm) | |
| (10) Musk-melon (Kharbooja
or Phoot) | |

The following are the opinions of Indian physicians on the uses and action of fruits:

APPLES.—Useful for functional disorders of the heart, and as a tonic.

FIGS AND GRAPES.—Good laxatives.

DRY GRAPES OR MUNNAKHA.—Nutritious and laxative; for this action raisin tea is often prescribed.

GRAPE LINCTUS OR MUNNAKHA CHUTNL.—Useful for patients who are tired of taking milk. It is prepared as follows:

Take

Munnakhas	..	..	..	..	5 parts.
Coriander or Mint Leaves	..	..	..	..	q.s.
Pepper	..	..	..	..	q.s.
Salt	..	..	..	..	q.s.
Mix well by grinding.					

GRAPES, ORANGES AND POMEGRANATES.—Useful to remove the taste of medicines, and to allay thirst in fevers.

POMEGRANATE JUICE.—An astringent and is considered beneficial for diarrhoea, but injurious in cases of cough and cold.

LEMONS.—Very useful in the treatment and prevention of scurvy; also in malarial fever, and to remove the taste after taking medicine.

RIPE MANGOES.—Laxative and tonic. The juice of raw roasted mangoes with a little salt, pepper and zeera (cummin seed) is considered useful in the treatment and prevention of sunstroke.

RIPE BAEI FRUIT.—Used for diarrhoea and dysentery.

JACK FRUIT.—The seed is an excellent food containing about 13% of proteins.

TAMARIND.—Soaked for a couple of hours, and the resulting liquid taken with a little sugar, is a refreshing drink in the hot weather.

PLANTAINS.—Very nutritious, but difficult to digest so big cardamoms are always added as they are considered to have a special action in the digestion of plantains. Palo, a flour made from bananas, makes nutritious but unpalatable chapatis.

COCONUT.—Nutritious, containing 5% of protein, 36% of fat, and 83% of carbohydrate. It is useful in the diet of diabetics. It is much

used in the preparation of sweetmeats. Apart from sweetmeats it is not so popular an article of diet as formerly.

WALNUTS.—Very nutritious, containing a high percentage of protein and fat.

White Europeans take fruit in the morning; the Indian custom is to take it in the afternoon.

FRUIT SOUP.—Take equal quantities of dried fruit, such as prunes, peaches, apricots, raisins and pears, wash them carefully and put to soak in cold water for two hours, well covered. Put on to cook over a slow fire in the same water as they were soaked. Add a small stick of cinnamon. Allow to cook until tender, but not mashed or broken. Add two teaspoons sago; cook until clear. Add sugar to taste. Remove from fire when juice is rich and thick and when cold add two cups of orange or grape juice. Serve cold.

SICK-ROOM RECIPES

Everything used in preparing food or drink for the sick should be scrupulously clean. Iron and tin saucepans are to be avoided; those lined with enamel are preferable, and, in most cases, a double saucepan can be used, which avoids the risk of burning the milk or other food that is being cooked. It should be remembered that sick people generally like less flavouring, whether salt or sugar, than is put in ordinary cookery.

ALBUMIN WATER

Take the white of an egg, remove the specks, and beat it thoroughly. Add it to half a pint of water and again beat. Strain before use. If this is given to a baby it should be sweetened.

ARROWROOT

Take a dessertspoonful of the best arrowroot, make into a smooth paste with a little milk, boil half a pint of milk with a lump of sugar, and pour it, while boiling, on the arrowroot, stirring quickly all the time.

It may be flavoured with lemon essence or with a little sherry, but it is generally preferred plain.

Water arrowroot is made in the same way, using water instead of milk, and it is better not sweetened but, according to taste, it can be flavoured with lemon and sugar or with salt or brandy.

BAEL DRINK

One or two tablespoonfuls liquid extract of unripe bael fruit (*Liq. Balae*) to a pint of water. It is used in dysentery.

BARLEY WATER

Take two ounces of pearl barley, wash it well in cold water, put it into a saucepan with a pint and a half of cold water, bring it to the boil and let it simmer gently for half an hour. Strain before use.

If wanted as a drink, and not as an addition to milk, it may be flavoured with lemon and sugar.

BEEF-TEA

Take a pound of freshly killed lean beef. Cut it small and put it with a pint of cold water into a covered jar in a warm oven until it is cooked. Alternatively it may be cooked in a saucepan over a fire, but it must only simmer and should not be boiled. Skim it now and then, and stir, whether in a jar or a saucepan. Pour off the beef-tea when cooked, through a strainer with large holes in it through which the sediment can pass, and let it stand in a shallow dish till quite cold, when the fat can be removed in a solid cake. A pound of beef ought to produce a pint of beef-tea. If it is boiled down to a smaller quantity it will be a jelly when cold, and some invalids prefer it in that form.

When it is warmed for use, flavour it with salt and pepper. Celery seed, or even a very little onion, may be used occasionally to vary the flavour.

Beef-tea is served, when solid food is allowed, with very thin crisp dry toast cut into fingers or squares.

BENGER'S FOOD

This is made according to the directions on the tin in which it is sold or occasionally by using chicken broth in place of milk.

BLANC-MANGE

Dissolve one ounce of fine isinglass in a pint of milk, strain it through fine muslin, and put it into a clean saucepan with an ounce of pounded sugar and the thin peel of a lemon. Let it warm very gently till it is nearly boiling, then take out the lemon peel and pour it into a wetted mould.

BREAD JELLY

Soak bread-crumbs in water or milk for one hour. Boil it in water, sufficient to cover it well, for another hour, with the addition of a little sugar and flavouring. Strain it through muslin or a fine sieve into a shape, and let it stand till cold. It should turn out of the shape like blanc-mange.

BROTH

Mutton, chicken, and veal broths are made in the same way as beef-tea, in a saucepan over the fire. The broth must be well skimmed. An old fowl will answer the purpose very well, or the lean part of a neck of mutton. The bones are not removed from the meat.

COCOA

All cocoa is much nicer if made with boiling milk instead of water, and if it is boiled again for a minute or two before being served.

CORNFLOUR BLANC-MANGE

Take two ounces of cornflour, one ounce of sugar and one pint of milk. Mix the cornflour with a little milk into a smooth paste, and boil the rest of the milk with the sugar and a few drops of almond, vanilla, or other flavouring. Pour the mixed cornflour into the boiling milk, stirring it quickly till it is thickened. Pour it into a mould that has been moistened with cold water.

CURDS AND WHEY

Put a pint of new milk in a glass dish, stir into it about two drachms of fluid rennet, and let it stand in a warm place until set.

If it is intended for use as a pudding, the milk should be sweetened before the rennet is added, and when it is set and cooled a little nutmeg and a few spoonfuls of whipped cream may be carefully placed on the top.

CUSTARD PUDDING, BAKED

Beat two eggs in a basin or pie dish, stir into it about half a pint of cold milk, sweeten it, grate a little nutmeg on the top, and bake it in a rather slow oven until it is set. Do not move the dish about while it is baking or it will not set firm; it will not be a success if the oven is so hot that the custard boils.

CUSTARD PUDDING, BOILED

Warm five ounces of milk with a lump of sugar and a piece of cinnamon, fresh lemon peel or a grate of nutmeg. Stir into it a well-beaten egg. Put it all into a mug, and place the mug in a saucepan of boiling water stirring the custard round, always in the same direction till it thickens. It will probably take a quarter of an hour to thicken. Pour it into small glasses before serving.

A savoury custard is made in the same way, using strong beef-tea and salt instead of milk and sugar.

EGG-FLIP

Take the yolk of an egg, beat it up well with an ounce of milk, and add to it two ounces of port or half an ounce of brandy, sweeten it, and grate a little nutmeg over it according to taste. It can be used either cold or warm, but must not be boiled.

EGGS, SCRAMBLED

Beat up two eggs in a basin with a little pepper and salt. Melt a piece of butter the size of a walnut in a small saucepan, put in the egg and stir with a spoon till nearly set. Serve on buttered toast on a very hot plate.

IMPERIAL DRINK

Take one drachm of cream of tartar, the juice of a lemon, and about a quarter of a pound of loaf sugar. Mix in a jug and pour upon it a pint of boiling water. It is a refreshing drink for feverish patients and is often ordered in cases of Bright's disease. If it is sweetened with saccharin instead of sugar it can be given to diabetic patients.

LEMONADE

Peel three lemons very thinly, so as to remove only the yellow part of the rind; pare off all the white, cut the pulp into thin slices removing the pips, put the pulp into a jug with as much of the rind as required, add about half a pound of loaf sugar and pour on it about a quart of boiling water. More sugar or water can be added afterwards, according to taste. It is very good when drunk quite hot, or it can be used with a lump of ice in it as a cold drink.

LIME WATER

Shake up washed calcium hydroxide (slaked lime) 50 in distilled water 5,000, and siphon off. To be kept in green glass bottles. Strength: $\frac{1}{16}$ gr. in 110 m (0.1 gm. in 100 millilitres).

LINSEED TEA

Put half an ounce of whole linseed with a pint of boiling water into a covered jar. Leave it by the side of the fire, or in a cool oven, for two or three hours. Strain it, and flavour it to taste with lemon and sugar, adding more hot water if it is too thick. It should be used quite hot, and it is very soothing to a sore throat or chest.

MEAT JUICE, RAW

Scrape $\frac{1}{2}$ lb. of lean beef into a saucer. Cover with cold water and leave for an hour in a cool place protected from dust. Then strain through muslin.

MEAT JUICE, SUBSTITUTE FOR

Mix the white of an egg with two ounces of cold water. Strain it and flavour it with a little Liebig's essence dissolved in a drachm of hot water.

OATMEAL DRINK

Boil a good tablespoonful of Scotch oatmeal in a quart of water for about twenty minutes, stirring it now and then. Add ginger, lemon and sugar, according to taste. It is a refreshing drink for thirsty patients, and there is a small amount of nourishment in it.

OATMEAL MILK

Tie a dessertspoonful of oatmeal in muslin, put it in half a pint of milk until the milk boils, then flavour with a little salt.

OATMEAL PORRIDGE

Boil one pint of water in a saucepan, and while it boils, sift in the dry oatmeal with one hand, while it is stirred with the other. Boil it for half an hour or longer. It must be stirred the whole time, unless it is made in a double saucepan. Serve in a soup plate, with a jug of milk or cream, and sugar, salt or treacle, according to taste.

PEPTONIZED MILK

Take one pint of milk, five ounces of boiling water, one drachm of pancreatic solution and twenty grains of bicarbonate of soda. Put all in an enamelled saucepan (a double one is best) near the fire, at a temperature of 140 degrees, for twenty minutes, then boil it up, and, as soon as it has reached boiling point, pour it off into a jug or basin and stand it in a cold place. It should cool quickly, otherwise it will get bitter.

TO PEPTONIZE MILK WITH FAIRCHILD'S POWDERS

To one pint of cold milk, add $\frac{1}{2}$ pint of water, and a measure of the powder. Mix well together and stand in a basin of hot water for twenty minutes. When cold pour into a saucepan and bring to boiling point.

TAMARIND WATER

A very refreshing drink may be made by adding a pint of hot water to a tablespoonful of *preserved tamarinds*, and setting aside to cool.

TOAST WATER

Take a slice of stale bread or bottom crust of a loaf, toast it carefully without burning, put it in a jug and pour over it boiling water; let it stand to cool.

TO QUENCH THIRST

A very weak infusion of *Cascarilla bark*, with a few drops of dilute hydrochloric acid added, will be found effective in allaying thirst during febrile conditions.

WATER GRUEL

Mix two small tablespoonfuls of groats or fine oatmeal in a little cold water till it is a smooth paste; add to it half a pint of boiling water, stirring it well, and boil it for a quarter of an hour. Milk gruel is made in exactly the same way, only substituting milk for water.

WHEY

The milk is warmed to not more than 194° F., rennet powder, liquid rennet or a solution of a commercial junket tablet is added in the proportions directed on the label, as in the making of junket. It is sufficiently coagulated in thirty minutes; the coagulum is then broken up with a fork and strained through muslin. One and a half pints of milk will yield one pint of whey, which contains rather more protein and fat than that obtained in the process of cheese making.

WHEY, WHITE WINE

Boil half a pint of milk, pour into it a wineglassful of sherry, and stir till it curdles. Strain before serving. Hot water may be added, to make it any desired strength.

HOW TO ALTER COW'S MILK TO MAKE IT LIKE HUMAN MILK

- (1) The casein, or curd, is three times as great in cow's milk.
- (2) The fat is in approximately the same proportion.
- (3) Human milk contains much more sugar.
- (4) The curd of cow's milk is in larger and harder masses.
- (5) Cow's milk is acid, from bacteria, while human milk is alkaline or only slightly acid.

Make the following Mixture:

Cow's milk	..	..	..	1½ oz.
Cream (15%) (fresh milk to stand for 6 hours, and the cream skimmed off)	..	..	..	1 oz
Barley water or lime water (see Sick-room Recipes)	..	..	..	½ oz.
Solution of Sugar of Milk (3 oz. milk sugar to 1 pint water)	..	..	..	1½ oz
Sodium Citrate	..	..	..	3 gr.

Dilution of cow's milk reduces the proportion of casein; fat (cream) has to be added to make up for the dilution, and sugar must be added as human milk contains a much higher percentage.

Barley water mechanically divides the curd of cow's milk, and makes it flocculent.

Lime water makes the curd more flocculent and diminishes the acidity.

Citrate of Soda, 1 gr. to every ounce of milk, also makes the curd more flocculent.

Cow's milk is acid from bacteria, and these are destroyed by pasteurization or sterilization.

ALCOHOL

In all alcoholic drinks, the principal constituent by which they affect the nutrition of the body is ethyl alcohol. Alcohol not only increases the vigour of the stomach movements, but it also stimulates very powerfully the secretion of gastric juice; while it exercises this influence in health, the action is more marked in certain diseases. Alcohol requires no digestion, and, unlike water, is rapidly absorbed by the mucous membrane of the stomach, passing at once into the blood. To obtain the greatest benefit from alcohol in disease, it should be given well diluted in small doses at frequent intervals.

The following is the amount of ethyl alcohol by volume in:

	Per cent
Alcohol Absolutum	99
Alcohol (U S P)	94
Spiritus Rectificatus	90
Alcohol Dilutum (U.S.P.)	64.5
Whisky	51 to 59
Rum, Gin, Strong Liqueurs	51 to 59
Proof Spirit (Spiritus Tenuior)	57.09
Brandy (Spiritus Vini Gallici)	43 to 57
Port	20 to 30
Sherry and Madeira	16 to 22
Champagne	10 to 13
Burgundy	9 to 12
Hock	9 to 12
Claret	8 to 12
Cider	5 to 9
Strong Ale or Stout	5 to 9
Beer and Porter	2 to 5
Koumiss	1 to 3

SPIRITS

WHISKY.—Ordinary whisky as it reaches the consumer is generally a blend of a spirit made from malt in pot stills, and a spirit prepared from grain in patent stills.

BRANDY.—The best brandy was originally produced in the Cognac district of France by the distillation of wine, six or seven bottles of wine producing one bottle of brandy. It was then kept in cask for 30 or 40 years; after this period it contains a high proportion of volatile ethers and aldehydes, to which the most valuable medicinal properties of brandy are due. The greater part of brandy now sold is made from "Silent spirit", flavoured with essences and coloured with burnt sugar.

RUM.—This is generally made by the distillation of fermented molasses produced in the manufacture of raw sugar.

GIN.—This is made by fermenting a mash of rye and malt, distilling and redistilling; juniper berries, salt, and sometimes hops, are added to the final distillation.

MALT LIQUORS

These include beer or ale, porter or stout.

BEER is the product of the fermentation of malt and hops. Malt is obtained by moistening barley, and allowing it to germinate in heaps at a moderate and regular temperature.

STOUT is made in the same way as beer, but its dark colour is due to caramel produced by first roasting the malt in cylinders.

WINES

Wine is made from the pure juice of the grape by fermentation.

DRY WINES.—These are non-sweet wines.

PLASTERED WINE.—This has been treated with gypsum to clear it, with the result that the tartrates are removed.

RED WINES.—These are made from the whole grape the pigment coming from the skins.

SPARKLING WINES.—These have undergone a secondary fermentation by the addition of sugar.

WHITE WINES.—These are made from the juice of grapes.

An important division of wines is into:

- (1) **NATURAL WINES**, which are those in which fermentation has been allowed to go to its full limit; and
- (2) **FORTIFIED WINES**, which are wines in which spirit has been added to prevent further acetic fermentation.

The former are usually sweet and of high alcoholic strength, while the latter are usually poor; both are poor in sugar and alcohol.

CLARET.—This is pure natural wine containing 8–12% alcohol, only $\frac{1}{4}$ % sugar and moderate amount of acids.

BURGUNDY.—This is similar to claret, but richer in alcohol and in extractive matter which gives it more body.

HOCKS.—Their acidity is more apparent than real, and they contain practically no acetic acid.

AUSTRALIAN AND CALIFORNIAN WINES.—These are full-bodied natural wines, chemically pure and containing rather more alcohol than most clarets.

SHERRY.—This is a term applied to a white wine of Spain; all sherries are both "fortified" and plastered. The percentage of sugar is low, and the acidity lower than most natural wines. Old sherry is valuable in treatment in that it develops a higher proportion of volatile ethers than any other alcoholic liquor, with the exception of genuine cognac.

PORT.—This is fortified, contains a large amount of "extract", 2–6% of sugar, tannic acid and more acetic than tartaric acid.

MADEIRA.—This resembles sherry and contains a high proportion of volatile ethers.

CHAMPAGNE.—This is made from the juice of black grapes; it undergoes two fermentations, the first in cask and the second in bottles for 2 years; during this period a constant temperature is most important. At the end of two years the deposit in the neck of the bottle is fixed to the cork by freezing and removed. The wine, which is sour and harsh, is rendered drinkable by "dosage", which consists in adding a solution of cane sugar dissolved in old champagne and good cognac.

A bottle contains about 5 volumes of carbon dioxide gas.

Champagne is a wonderful stimulant and restorative and has saved untold lives by turning the scale at a critical time.

COUNTRY LIQUOR.—It is made by the fermentation of mohua, molasses, and, in some parts of the country, from coconut, dates, rice, and palm juice. It is sold at the fixed strengths of 25° and 50° underproof.

PROOF-SPIRIT.—This is defined, by an Act of Parliament, as "being such as shall, at a temperature of 51° F., weigh exactly 12/13 part of an equal measure of distilled water". Weaker spirits are termed "underproof" and stronger spirits "overproof". Thus, "25 degrees overproof" means a mixture of alcohol and water in such proportion that 100 volumes of this mixture, when diluted with water to make the mixture proof-spirit, yields 125 volumes of proof-spirit; and "25 degrees underproof" means a mixture of proof-spirit and water containing, in 100 volumes, 75 of proof-spirit and 25 of water.

GENERAL RULES FOR DIETING.—The following general rules by Hutchison should always be thought of in drawing up any scheme of diet.

- (1) In acute diseases it is well to recommend a special plan of diet. In chronic cases it is better to forbid those articles which are likely to prove harmful.
- (2) Before recommending any article ascertain if the patient likes it and how it agrees with him.
- (3) No article should be forbidden unless there are good reasons for doing so.
- (4) Unless there is some strong contra-indication attention should always be paid to the wishes and tastes of the patient. This is especially important with Indian patients.
- (5) If any article of food disagrees reduce the quantity rather than forbid it entirely.
- (6) Changes of diet should, if possible, be made gradually.
- (7) Never prescribe a diet without first ascertaining the patient's habits as regards work and exercise.

NOTES FOR GUIDANCE OF INDIAN PRACTITIONERS IN THE TREATMENT OF EUROPEAN PATIENTS

1. The blandest diet is albumin water, barley water, and whey; the next is peptonized milk and then cow's milk, diluted with plain

water, soda water, barley water or lime water, the quantity of the diluent being gradually reduced until the patient is on a diet of whole cow's milk or Horlick's malted milk.

2. Next in order comes raw meat juice, or chicken jelly, mutton or chicken broth, which, later on may have toast or a little well-cooked rice soaked in it. Beef-tea is more difficult of digestion, and liable to cause or increase diarrhoea.

3. The patient may next be allowed what is known as glass custard or egg-slip, with or without a little brandy, which improves the taste and power of absorption, or one of the patent foods such as Mellin's or Benger's, or arrowroot, in the absence of flatulence.

4. Then boiled custard, scrambled eggs and, a little later, baked custard pudding and lightly made cornflour blanc-mange.

5. Next, well-cooked oatmeal porridge and milk, poached and lightly boiled eggs, bread and butter, strawberry jam.

6. Chicken cream or quenelle (a mixture of pounded chicken and cream), boiled fish with or without plain white sauce.

7. Minced chicken.

8. Boiled chicken; pigeon or quail (cooked in any way except roasted).

9. Roast chicken and bread sauce, boiled mutton, and finally roast mutton and beef. Veal is seldom obtainable in India and is very indigestible. Ham is easily digested and is an excellent form of meat during convalescence.

10. As regards vegetables, well-cooked spinach (palak), or cauliflower (phoolgobi) is the best for invalids, followed by potato (especially mashed potato), onion (pyaz), turnip (shalgam), carrot (gajar), cabbage (band gobi), peas (mutter) and beans (pbalae); radish (mooli) and cucumber (kakri) are very indigestible.

11. The best fruits in acute disease are grapes and oranges, followed, in convalescence, by stewed apples, apricots or peaches. Figs (anjir), pineapple (annanas) and coconut (gola) are very indigestible.

12. Stimulants.—Tea is light and stimulating and can be taken in almost all acute conditions including enteric fever. China tea causes less digestive disturbance than Indian or Ceylon tea. Coffee is a good stimulant (especially if given strong per rectum), but causes biliousness with some people; cocoa does so even more.

It is well known that if alcohol is suddenly stopped as the result of illness or accident a person who takes it in excess is very liable to develop delirium tremens; it is, therefore, advisable to give whisky or brandy in moderation.

The guiding principle, in acute conditions such as enteric, should be to withhold stimulants as long as possible, in order to have this help for a failing heart at the most critical period of the illness. As much as 10 oz. of whisky or brandy can then be given in the 24 hours, varying it according to the age of the patient, his previous alcoholic history, and the condition of the heart.

Champagne (iced) is excellent, the only objection being expense. During convalescence, burgundy, the Australian claret

("Sauvignon") and port are useful tonics; stout is especially recommended for women during lactation.

INSTRUCTIONS FOR PREPARATION.—See Sick-Room Recipes.

DIET IN CERTAIN DISEASES

ALCOHOLIC CIRRHOSIS OF THE LIVER

Early cases—those, for example, which first indicate trouble by an attack of hæmatemesis—have been wonderfully benefited in my practice (E.J.O'M.) by a course of peptonized milk for three months, followed by a milk diet for another six or nine months, and those cases in which the patient has given up alcohol entirely appear to be completely cured.

AMOEBIIC OR BACILLARY DYSENTERY, ACUTE

The treatment by diet is of great importance; the bowel requires physiological rest, and the diet should be limited to whey and albumin water. Only small quantities should be taken at a time, very slowly, and lukewarm.

CARDIAC DISEASE

Considerable help can be given by dieting when the heart's action is impaired. Food should be given in small quantities at short intervals; it should be easily digested, dry and non-flatulent; to this end, carbohydrates should be strictly limited, also fats. The importance of a dry diet is insisted on by all writers for the following reasons.

- (1) The rapid absorption into the circulation of a large amount of fluid throws a mechanical stress on the heart.
- (2) Fluids, in heart disease, are slowly absorbed and therefore cause distension and flatulent dyspepsia.
- (3) By withholding liquids the blood becomes more concentrated, and water then passes from the dropsical tissues into the blood instead of vice versa. The total fluid, therefore, should be limited to about 20 oz., and not more than 3 or 4 oz. should be taken at a time.

CHOLECYSTITIS

Yolk of egg and all food containing yolk of egg must be absolutely avoided. Cream, butter and fats are strictly limited. Pork, soups and pastries should not be taken, but the patient may take an ample amount of green vegetables and non-acid fruit.

CHOLERA

No food whatever should be given during the acute stage, only liquids, as water and soda water, in very small quantities at a time. Stimulants should be given very sparingly, if at all, by the mouth. When reaction sets in the return to food must be made with great caution. Begin with very thin barley water, then thin arrowroot,

whey, peptonized milk diluted with barley water, and so to pure milk, every increase being made slowly and with great care.

DIABETES—See Diabetes Mellitus.

DIARRHOEA

ACUTE.—If very severe, stop all food for 24 to 48 hours only barley water in sips being given for thirst. Then weak arrowroot or cornflour, next milk and lime water. Avoid meat extractives, and see that nothing is given which is either very hot or cold, as unless lukewarm peristalsis will be stimulated.

CHRONIC.—Avoid fruit and green vegetables as these leave a bulky residue. Hot liquids and alcohol should not be taken. Milk should be given with lime water.

HILL DIARRHOEA.—Milk.

DIARRHOEA, INFANTILE

The danger of this disease lies in the rapid withdrawal of water from the body with consequent prostration and collapse. A most successful method recently introduced is to induce the child to drink large quantities of normal saline. This should be kept in an ordinary feeding bottle and frequently given to the patient. The resulting increase in weight bears testimony to the efficacy of this treatment. Milk must be immediately and completely stopped. When the child is better whey may be given, but return to milk gradually and with great caution.

DYSENTERY, CHRONIC

Milk diet is of the first importance and may be supplemented by sour milk treatment.

Food should be taken in small quantities—not more than 4 oz. every 2 hours; it must be taken slowly and lukewarm.

FATTENING DIET

This is required in:

- (1) Wasting diseases such as tuberculosis;
- (2) Convalescence from acute illness; and
- (3) Nervous disorders such as neurasthenia.

Increase the proportion of fat and carbohydrate in the diet. One of the simplest ways is by the addition of milk and cream; butter, bacon and suet are also useful.

• Rest, more or less complete, is always an important aid.

GASTRIC AND DUODENAL ULCER—See Gastric and Duodenal Ulcer.

GASTRITIS

Avoid alcohol except, if desired later on, a small quantity of light wine or diluted whisky at meals.

In making tea the boiling water should not be allowed to remain in contact with the tea-leaves for longer than three minutes.

Avoid coffee. Avoid liver, sweetbreads, kidney, roe, brain, salmon, plaice, halibut.

Avoid pips and skins of fruit (whether raw, cooked or in jam, and currants, raisins and lemon-peel in cakes), nuts and unripe fruit. For example, an orange may be sucked but not eaten. Currants, raisins and figs are particularly undesirable, and all fruit is better stewed than raw. Marmalade only in the "invalid" form; red currant, apple and other fruit jellies, and damson cheese allowed, but no ordinary jams.

Avoid potatoes, onions, turnips, carrots, parsnips.

Avoid all raw vegetables, whether taken alone (celery, water-cress) or in pickles or salad; green vegetables must be passed through a sieve and mixed with butter in the form of a purée, and other vegetables are best in purée form. Porridge is only allowed if made with the finest oatmeal.

Avoid vinegar, sour fruit, pepper, mustard, curry, chutney, new bread, tough meat, pork, made-up dishes, high game.

Abundant butter and cream, honey and golden syrup, and eggs (except hard-boiled) should be taken. (New Lodge Clinic.)

GOUT, ARTERIO-SCLEROSIS AND HIGH BLOOD-PRESSURE

We are, unfortunately, still very much in the dark as to the relationship of uric acid to general metabolism and the gouty state. There is no routine plan which is suitable to all cases, and each particular case must be studied on its own merits. The following should be allowed or forbidden:

Allowed

Chicken, pigeon, quail (in moderation).
Fish, eggs, vegetable soups.
Fresh green vegetables and fresh fruit.
Rice, sago, tapioca.
Toast or stale bread.
Potatoes and salads.
Skimmed milk, China tea.

Forbidden

All meat extracts, and essences.
Rich gravies, sauces and spiced food.
Soups, food that has been recooked, duck and goose.
Sweetmeats, preserved fruit and sugar.
Spices and pickles.
Beer, stout, burgundy and all liqueurs.

Allow natural mineral waters, and lime juice well diluted. Tobacco should be limited.

OBESITY

Allowed

Clear soup and broth.
Fish, meat, poultry, eggs.
Fruit, green vegetables.
Stale bread or toast.
Tea and natural mineral waters.

Forbidden

Thick soups, oil, ghee, cream, rice, sago, tapioca, oatmeal, potatoes.
Peas, carrots, beetroot.
Sweetmeats, pastry, sugar, milk.
Beer, porter, port and liqueurs.

RENAL DISEASE—*See* Nephritis.

RESPIRATORY DISEASES

ASTHMA.—The last meal should be small and not taken late. The diet should be dry and small in quantity. If the patient has an idiosyncrasy to any particular food this should, of course, be excluded.

BRONCHITIS.—Hot liquids or semi-liquids help to promote secretion from the tubes, therefore give hot tea, milk, broth, etc.

PNEUMONIA.—Diet as for acute fevers, but great care should be taken to avoid an over-loading of the stomach. Weak tea and plenty of barley or plain water.

SKIN DISEASES

In the majority of skin diseases, no special regulation of the diet is required, but in the following cutaneous lesions a careful dieting may be of some direct help.

ECZEMA.—In very acute cases milk alone should be given; alcohol and salt should be limited in chronic cases.

PRURITUS.—Coffee and alcohol should be avoided, also all highly flavoured, salted and preserved foods.

URTICARIA.—Fish, eggs, oatmeal, strawberries and any kind of acid fruit will cause urticaria. There is a close relationship between urticaria, peptic ulcers of the mouth and migraine, due to an idiosyncrasy to certain articles of diet; in one case I have traced this to apples, and in another, to strawberries.

SLIMMING DIET—*See* Obesity.

SPRUE—*See* Sprue.

TUBERCULOSIS OF THE LUNGS

The patient should be given at least five meals a day. Many Indians are much underfed in this disease, as they try to retain the custom of only two meals; the patient's appetite and digestion are too feeble to enable sufficient food to be taken on only two occasions during the day.

While there should be at least five regular meals, liquid food, such as milk, should on no account be taken between the meals, as this interferes with digestion.

The food should be easily digestible, well cooked, palatable, and varied as much as possible. As much milk, cream, ghee and butter should be taken as the patient's digestion will permit. Extract of malt and cod-liver oil appears to have a beneficial action apart from its food value, and should be given regularly provided that the patient enjoys it. Comparatively high temperatures are not a bar to an ample and solid diet in this condition.

TYPHOID FEVER

As the result of recent experience the old-fashioned milk dietary has been profoundly modified. The principles underlying the choice of dietary in this condition are:

- (1) Avoidance of those foods which are digested or assimilated with difficulty, or which reach the lower end of the ileum in a solid state.
- (2) Avoidance of any substance liable to give rise to meteorism. Thus, green vegetables must be excluded on account of their cellulose content and their liability to cause flatulence. Milk, again, is not easily digested and produces flatulence; it is best administered in small quantities in dilute form. Many cases of enteric fed exclusively on a milk diet presented, at autopsy, a firm mass of curdled milk in the lower ileum.
- (3) Supplying an easily assimilable food of high calorific value. Sugar fulfils these conditions and should be added, as far as possible, to all fluids.
- (4) Dilution and elimination of toxins, which is best effected by inducing the patient to drink large quantities of water, barley water or lemonade. Brandy and port may also be given in small amounts.

The diet may be supplemented by lightly boiled eggs, bread and butter without crusts, custards, pounded fish, and mashed potatoes, according to the patient's appetite and his capability of assimilating food. Meat extracts have a negligible food value.

By such treatment exhaustion is avoided, the heart muscle is supplied with the all-important carbohydrate and convalescence is materially shortened.

SCALE OF DIET FOR EUROPEAN PATIENTS IN HOSPITALS OR DISPENSARIES AND MENTAL HOSPITALS

Articles	Full diet	Half diet	Chicken diet	Low diet	Milk diet
Meat	12 oz.	8 oz.	nil	8 oz.	nil
Bread	12 "	8 "	8 oz.	4 "	"
Chicken	nil	nil	one	nil	"
Vegetables	12 oz.	12 oz.	12 oz.	"	"
Dal	2 "	2 "	2 "	"	"
Rice	3 "	3 "	3 "	"	"
Tea	2 "	2 "	2 "	2 oz.	"
Sugar	4 "	4 "	4 "	4 "	2 oz.
Milk	12 "	12 "	12 "	32 "	64 "
Butter	1½ "	1½ "	1 "	1 "	nil
Spices, salt, pepper, and onion	3 pies	3 pies	3 pies	3 pies	"
Fruits or pudding	2 annas	2 annas	2 annas	1 anna	"
Eggs	Two	Two	Two	Two	"
Ghee	2 oz.	2 oz.	2 oz.	nil	"
Quaker oats or sago and squee	1 "	1 "	1 "	1 oz.	"
Charcoal for cooking	3 lb.	3 lb.	3 lb.	3 lb.	1 lb.

SCALE OF DIET FOR INDIAN PATIENTS IN HOSPITALS OR DISPENSARIES

Articles	Full diet meat		Full diet Atta		Full diet rice		Full diet Atta, rice		Low diet		Half diet Atta		Half diet rice		Milk diet		Spoon diet	
	Md	Sr	Ch	Md	Sr	Ch	Md	Sr	Ch	Md	Sr	Ch	Md	Sr	Ch	Md	Sr	Ch
Atta ..	0	0	10	0	0	10	0	0	6	0	0	6	0	0	6	....	....	....
Dal ..	0	0	1	0	0	2	0	0	1	0	0	1	0	0	2	....	....	....
Mutton ..	0	0	3	..	..	..	..	..	..	0	0	2	..	..	..	....	....	....
Vegetables ..	0	0	3	0	0	3	0	0	3	0	0	2	0	0	3	..	....	....
Ghee ..	0	0	$\frac{1}{2}$	0	0	$\frac{1}{2}$	0	0	$\frac{1}{2}$	0	0	$\frac{1}{2}$	0	0	$\frac{1}{2}$	....	....	....
Salt ..	0	0	8	0	0	$\frac{1}{2}$	0	0	$\frac{1}{2}$	0	0	$\frac{1}{2}$	0	0	$\frac{1}{2}$	....	....	....
Spices ..	0	0	$\frac{1}{12}$	0	0	$\frac{1}{2}$	0	0	$\frac{1}{2}$	0	0	$\frac{1}{2}$	0	0	$\frac{1}{2}$	....	....	....
Fuel (for cooking) ..	0	1	0	0	0	12	0	1	0	0	0	12	0	1	0	0	0	8
Rice ..	..	..	..	....	..	..	0	0	8	0	0	3	..	..	..	..	0	4*
Milk ..	..	..	..	....	..	..	....	..	..	..	..	..	..	..	0	1	8	0
Sugar ..	..	..	..	....	..	..	..	..	..	..	..	..	..	..	0	0	1	1

* Or sago 2 ch. or arrowroot 2 ch.

SCALE OF DIET FOR GENERAL MENTAL PATIENTS (INDIANS)

Atta	..	12 ch. (mixed wheat and gram)	Fuel coal	..	5 seers
			Firewood	..	20 seers (to start the furnace)
Dal	..	2 "	Spices	..	$\frac{1}{4}$ ch.
Oil (mustard)	..	$\frac{1}{2}$ "			
Vegetables	..	3 "			

SCALE OF DIET FOR PATIENTS UNDERGOING TREATMENT IN THE INFIRMARY AND DISPENSARY SECTION OF A MENTAL HOSPITAL

Full Diet

Atta wheat	..	6 ch.	Spices	..	$\frac{1}{2}$ ch.
Rice	..	4 "	Vegetables	..	3 "
Dal Moong	..	2 "	Firewood	..	15 seers (to start the furnace)
Ghee	..	$\frac{1}{2}$ "	Fuel coal	..	5 seers
Salt	..	$\frac{1}{2}$ "			

Milk Diet

Milk	..	1 $\frac{1}{2}$ seers	Fuel coal	..	4 seers
Sugar	..	1 ch.			

Extras

Milk	..	15 seers	Sugar	..	15 ch.
Sago	..	1 seer			

All patients get the following alternately in the morning :

(1) Soaked gram 1 ch. per head, (2) Khichri 1 ch. per head, (3) Parched gram 2 ch. per head.

Hospital cases get sago $\frac{1}{2}$ ch. per head, early in the morning.

DILATATION OF THE STOMACH, ACUTE

This sometimes occurs within the first 48 hours after an abdominal operation and is recognized by fullness in the epigastrium with, generally, a rising pulse rate. It may be suspected if the patient ought to be well, but is not well. If the condition is suspected, a stomach tube (preferably a Ryle's tube or a nasal tube) must be passed and the stomach aspirated through it by means of an ear syringe. If large quantities of fluid can be withdrawn the condition is certainly present and the tube must be left in position for 48 hours, during which the stomach is frequently aspirated. Another method, after the first aspiration, is to raise the foot of the bed and let the end of the tube hang in a jug of water beside the bed so that syphonic action continues. Before the tube is removed, give the patient some coloured fluid to drink, or pour it down the tube; if none can be aspirated after an hour and a half it is safe to remove the tube. Fluid loss is made good by intravenous or rectal drip salines.

DIPHTHERIA

The following types occur: faucial, laryngeal, nasal, cutaneous and sundry. In all, the presence of a greyish-white or yellowish slough, which is not easily detached and leaves a bleeding surface, is clinical evidence of diphtheria requiring immediate and full treatment with antitoxin.

FAUCIAL.—There may be a widespread hyperaemia with a small ulcer, or vice versa. The glands are almost always enlarged.

A slough spreading from the tonsil to the fauces is almost pathognomonic of diphtheria and sometimes the throat has a characteristic foul smell. The temperature is usually between 99° and 101° F. almost never as high as 103° F., and the patient is ill.

LARYNGEAL.—Although usually secondary to faucial diphtheria this may occur alone, when it is likely to be missed unless the physician remembers that a recent severe laryngitis, where the patient is obviously ill or coughs up blood, is likely to be diphtheria, especially if the patient is about 3 years old. (*See also* Croup.)

NASAL DIPHTHERIA.—This occurs most commonly as a greyish sloughing ulcer on the inferior turbinal bone; there is nearly always some bleeding from the nose. The writer once saw a case in a child six days old. Occasionally, the whole nose seems to be full of a yellowish "wash-leather" slough.

SUNDRY TYPES.—Any mucous surface, such as the conjunctiva, the vagina, the anus or even the glans penis may be infected, the latter generally after a careless circumcision.

CUTANEOUS DIPHTHERIA.—*See* Ulcers.

TREATMENT.—

ANTITOXIN.—Give 40,000 to 80,000 units of antitoxin at the earliest possible moment, and repeat in 24 hours. Do not wait for culture reports, although it is permissible to examine swabs if this can be done immediately; even so, a negative swab is of no value in face of a positive clinical diagnosis. *Vincent's spirillum* may, however, produce a similar appearance of the fauces, so if it is present in large numbers it can be assumed to be the cause.

In severe cases penicillin should be given. (*See* Chemotherapy.)

The first dose of serum is given intramuscularly, or half the dose may be given into the muscle and half into a vein, very slowly, with $\frac{1}{2}$ c.c. adrenaline added to prevent allergic phenomena.

It has been found that neuritis and myocarditis are almost unknown if a large dose of serum is given in the first 24 hours.

The later the treatment is started the more serum will be required.

GENERAL.—Keep the patient flat in bed with one pillow for at least 3 weeks, and when he is convalescent do not allow sudden movements; many a diphtheritic patient has died through suddenly sitting up in bed.

Nasal feeding may be necessary if pharyngeal paralysis occurs later.

Diet should contain a high proportion of salt in order to maintain blood-pressure; synthetic adrenal cortex 2-5 mg. intramuscularly once a day has been given with the same object.

When antitoxin is not available reliance must be placed on other methods, the only one of any avail being penicillin, 200,000 units every 24 hours in eight three-hourly doses. Failing the above, the patient is given the following:

R. Liquor. Hydrarg. Perchlor.	..	..	5j
Pot. Iodid.	..	..	gr. 5
Glycerin.	..	..	℥ 30
Aq. ad	..	..	3ss

Sig: a tablespoonful every four hours.

A gargle of Milton, one drachm to 4 ounces of water, may also be used; should paralysis develop vitamin B is given, about 12 mg. a day. If the diaphragm or the intercostal muscles are affected keep the patient in an "iron lung" until the paralysis disappears, which it generally does in about six weeks.

If paralysis occurs it usually begins about the third week of convalescence, the common site being the eye (third or sixth nerve), the pharynx, larynx, legs and trunk. If the patient recovers, so will the paralysis.

SCHICK TEST.—About two minims of Schick Test toxin are injected intracutaneously. If the patient is susceptible a reddish area, half to one inch in diameter, appears within three days and lasts for about a week. When it fades a brownish area is left and scaling of the skin takes place.

DISLOCATIONS

Early and gentle reduction, with good relaxation of the surrounding muscles, is the key to success.

SHOULDER.—The patient generally has fallen on his outstretched hand, so the shaft of the humerus, with the acromion as a fulcrum, has levered the head out of its socket through the weak lower part of the capsule.

Diagnosis.—Compared with the rounded other side the point of the shoulder makes a sharp right angle with the acromion sticking out. The patient cannot put his hand on the other shoulder. The head of the humerus generally can be felt and there is no crepitus.

Treatment.—The patient's elbow is flexed to a right angle and the surgeon holds it in one of his hands (right for right and left for left) Taking the patient's wrist in his other hand, he gently everts the forearm until it is nearly parallel with the surface of the abdomen. He now draws the elbow gently downwards. This position and traction are maintained for two minutes, during which the dislocation will often be felt to reduce itself and the head of the humerus slips quietly into place. When this occurs the patient gives a gasp of relief and finds he can put his hand on the other shoulder, while the affected one fills out to its normal round contour. Eversion stretches and soon tires the subscapularis, spasm of which must be overcome before reduction can take place.

If, after two minutes of the above simple manoeuvre of eversion and traction, reduction has not occurred, the elbow is gently brought forward along the chest wall until it is almost in the nipple line, when another pause is made, eversion and traction being maintained. This may do the trick, but if not, the elbow is gently drawn forwards, away from the body, while the forearm is inverted until the hand rests on the other shoulder. Should this method fail, the patient

should be given a general anaesthetic and another gentle effort made; if there is still no reduction, the old method of placing one's heel in the patient's armpit while traction and twisting are maintained on the arm may succeed, but this method is not recommended.

After-treatment.—A sling should be worn for three weeks and abduction of the arm beyond a right angle avoided for three months.

ELBOW.—Backward dislocation is important not only because it is common, but also because good treatment yields a perfect joint, while bad treatment causes lifelong disability. A fall on the hand while the elbow is bent is the common cause, the same injury as that producing supracondylar fracture, from which dislocation must be carefully distinguished.

Signs.—The olecranon is prominent and is not in line with the condyles of the humerus, there is no crepitus, and flexion to less than a right angle is almost impossible.

Treatment.—Most cases, if seen early, can be reduced by traction on the forearm with an assistant holding the upper arm; this traction should be persevered with for some minutes and the joint should not be moved, because the less movement the less damage. If this manoeuvre fails the joint should be gently straightened and hyper-extended; this disengages the coronoid process from behind the lower end of the humerus, and sustained traction in this position will often effect reduction.

If neither of these methods succeeds, the surgeon puts his knee in the bend of the patient's elbow, which he flexes over it, while an assistant presses the olecranon forward. When there is any difficulty a general anaesthetic is given, because the resulting relaxation makes reduction easy.

If a dislocation is neglected for eight weeks or longer, reduction is generally impossible and excision of the joint is required.

After-treatment.—The insertion of the brachialis anticus, and sometimes of the biceps, is damaged, so if straightening and movement of the joint are allowed before absorption of the traumatic exudate osteogenic cells from the torn periosteum at the insertion of these muscles are shed all over the bend of the elbow and myositis ossificans results.

On the other hand, if the elbow is fully flexed while it is yet swollen interference with the circulation may cause Volkmann's ischaemic contracture (see page 285). Correct treatment is as follows.

After reduction a plaster slab is applied and bandaged with a soft bandage to the back of the arm and forearm, with the elbow flexed to about 80 degrees. A careful watch is kept on the radial pulse and if it shows signs of failing the elbow is straightened until it returns and kept in that position. When the traumatic swelling has subsided the slab is removed and the elbow flexed to an acute angle by means of a short sling. It is kept in this position for three weeks, during which the shoulder, wrist and fingers are freely exercised. Weeks or even months may elapse before the arm can be

straightened fully, but it happens in time and forcible attempts to straighten it must never be made or permanent stiffness may result.

DISLOCATION OF THE SEMILUNAR (LUNATE) BONE OF THE WRIST.—This is also important, because it may cause pressure on the median nerve and flexor tendons with consequent crippling of the hand, whereas early reduction is easy and saves the hand. The cause generally is a fall on the palm of the dorsiflexed hand, which forces the bone out of its socket.

Diagnosis.—A tender lump is felt on the palmar surface behind the flexor crease of the wrist. Movement of the wrist and fingers is painful and limited, the fingers being held in semi-flexion. Signs of median nerve paralysis may be present.

Treatment.—The surgeon puts his knee in the angle of the patient's flexed elbow and, using this as counter-traction, pulls hard on the patient's hand, moving it gently from side to side, while pressing firmly with his other thumb on the lump. If the wrist is now slowly flexed, the thumb exerting the pressure will generally feel the bone slip into place (Watson-Jones's method). If this fails an assistant should apply the traction and the surgeon should press with both thumbs.

After-treatment.—For about a week the wrist is kept in flexion by a plaster slab which is then replaced by a straight or slightly dorsiflexed slab for another two or three weeks. Finger movements, writing, etc., are maintained throughout.

DISLOCATION OF THE METACARPO-PHALANGEAL JOINT OF THE THUMB.—The common cause is forcible hyperextension of the thumb, the base of the phalanx resting on the dorsum of the metacarpal.

Treatment.—Continued traction should first be applied with one hand, while the other tries to manipulate the phalanx into place. If this fails, the thumb should be hyperextended with one hand, while the other tries to press the base of the phalanx over the head of the metacarpal.

If skilful and continued attempts fail to effect reduction, the phalanx has buttonholed the joint capsule and probably got entangled with the tendons. Operative reduction through a lateral incision is then required. Dislocations of the fingers are dealt with similarly.

ACROMIO-CLAVICULAR JOINT.—There are two degrees of dislocation, complete and incomplete, depending upon whether the conoid and trapezoid ligaments which bind the clavicle to the coracoid process of the scapula and hence prevent the scapula from dropping, are torn or merely stretched.

The condition is obvious, the arm is lowered and the sharp outer end of the clavicle is easily felt above the acromion instead of being level with it. The more lateral position of the lesion and the absence of crepitus distinguish it from fracture of the clavicle.

The object of treatment is to raise the arm to its normal level and keep it there for ten weeks, while the torn ligaments heal. The

surgeon raises the patient's flexed elbow and depresses the clavicle until the latter is in its normal position level with the acromion.

A piece of Elastoplast four inches wide is now applied to the elbow, then along the front and inner part of the arm up to the clavicle the outer edge of the Elastoplast being at least an inch mesial to the outer end of the clavicle; the Elastoplast is now carried over the clavicle and down the back of the arm to the elbow again. Three or four turns of Elastoplast, which must be tightly stretched, are needed because the unsupported weight of the arm is considerable. A sling is also applied.

After-treatment.—As usual, the fingers and wrist are kept busy and the shoulder joint is exercised. A method that is gaining popularity is to fix the clavicle to the coracoid by means of a rustless steel or vitallium screw, but this needs considerable experience and a good X-ray plant. Operations on the acromio-clavicular joint itself are useless. If, as often happens, the joint is left permanently weak, if dislocation recurs, or is never permanently reduced, the disability is not great, and the writer knows at least one athlete whose two acromio-clavicular joints have been dislocated for many years.

HIP JOINT.—Students are generally taught so much anatomical detail about dislocation of this joint that when the moment of trial comes they are either too ignorant of practical details or too frightened of failure to attempt reduction. What they should be taught is that prompt reduction under a general anaesthetic is both essential and easy; should the surgeon be called to the scene of the accident and no anaesthetic be possible, he should always make a gentle attempt to reduce the dislocation in the manner described below, and he will often find that he is successful.

Cause.—When the hip joint is flexed and adducted, as in stooping or in sitting with the legs crossed, a *posterior* dislocation is readily produced by a weight falling on the back in the former case, or in the latter by a severe blow on the flexed knee in the long axis of the femur as when an aeroplane or a motor car comes to a sudden and unexpected stop. If the hip is abducted, an *anterior* dislocation is more likely.

Diagnosis.—If the reader, who is presumably seated, will stretch out his legs, invert his right foot and rest his right heel on the outer side of the left foot, his right leg is in the position it would occupy after a posterior dislocation. If he now moves his right foot so that its outer edge is resting on the floor, the leg is in the position of anterior dislocation (which is rarer than posterior). It is also in the position of fracture of the neck of the femur, from which anterior dislocation is distinguished by the absence of shortening, the lack of mobility and the presence of the head of the femur in the groin.

Treatment.—The patient is laid on the floor and if possible an anaesthetic is given. An assistant holds the patient's pelvis firmly on the floor. The surgeon now flexes the patient's hip; if the leg is inverted and adducted he gently everts and abducts it; if it is everted

and abducted, he gently inverts and adducts it. In short, whatever the dislocation, he first flexes the hip and then moves the limb into a neutral normal position. The result of these manipulations generally is to manoeuvre the head of the femur on to the posterior edge of the acetabulum, where it can be felt. All that is now necessary is for the assistant to hold the patient's pelvis firmly on the ground while the surgeon lifts the dislocated leg, gently and slightly adducting, abducting and twisting it the while, until a pleasing and unmistakable gliding movement is felt which indicates that reduction has taken place. The leg is now straightened. Few operations give the surgeon or the patient more satisfaction.

After-treatment.—Just as in the case of the elbow joint, early movement may cause dissemination of osteogenic cells with resulting myositis ossificans; further, X-ray pictures have shown that the dislocation is often associated with fracture of the lip of the acetabulum. Reduction restores the fragment to its right position, but early use of the limb may cause redislocation or, later, lipping, with consequent pain and limitation of movement. The modern after-treatment, therefore, is to immobilize the slightly flexed and slightly abducted hip and the slightly flexed knee in plaster, which is retained for a couple of months. If X-ray examination shows fracture of the acetabular lip the plaster is kept on for a month longer.

RUPTURE OF LIGAMENTS IN THE KNEE JOINT.—

Complete dislocation is a rare accident, which is of course associated with rupture of the crucial and the lateral ligaments.

The anterior crucial ligament, which is taut when the knee is straight, may be ruptured by sudden and forcible hyperextension; the sign is abnormal anterior mobility of the tibia on the femur and the ease with which hyperextension can be produced.

The posterior crucial ligament is taut when the joint is flexed and may be ruptured by a violent blow to the upper end of the tibia with a flexed joint, the tibia shows abnormal posterior mobility on the femur.

Treatment of all three conditions is to immobilize the knee in plaster of Paris for three months, during which vigorous quadriceps drill is carried out, the knee should be flexed at 30° from the straight. This treatment gives better results than any operation yet devised. If a case is first met with some weeks or months after injury, the above treatment should first be tried. If it is a failure, tendon grafting by Hey Groves's method offers the best hope.

OUTWARD DISLOCATION OF THE PATELLA.—As an isolated accident this is rare, but as a recurrent or habitual condition it is not uncommon and is often associated with knock-knee for the obvious reason that the quadriceps likes to pull in a straight line. Reduction is automatic or at least easy, when the leg is straightened. The milder cases of recurrent dislocation are cured by moving the tubercle of the tibia to the inner side of that bone, so as to straighten the line of muscular pull; the inner side of the joint capsule is

generally plicated at the same time. If there is severe knock-knee this must be corrected by osteotomy of the femur.

DISLOCATION OF THE ANKLE.—This results from a heavy fall on either side of the foot, inward dislocation being far commoner than outward because the latter generally causes a Pott's fracture.

Treatment.—The injury causes rupture of the joint ligaments, which take ten weeks to mend, so the foot is kept at right angles in plaster for at least that period.

DISLOCATION OF THE JAW.—This is always in a forward direction and occurs when the mouth is wide open, at which time the condyle rests on the *eminentia articularis* just in front of the joint socket. A wide yawn, a blow, or over-zealous use of a mouth gag may cause the accident. The dislocation is generally bilateral but may be unilateral, and is often reduced by the patient.

Signs.—The patient cannot shut his mouth and the condyles can be felt in front of their normal position, with a hollow behind them.

Treatment.—Massage of the masseters for a couple of minutes before reduction helps to relieve muscle spasm and makes reduction easier.

The surgeon wraps a handkerchief or some sort of cloth round his thumbs, which he then puts into the patient's mouth. He firmly presses the patient's molar teeth downwards and backwards with his thumbs, while his fingers under the chin raise it. After a few moments the masseters and pterygoids tire, the condyles slip over the *eminentia articularis* into the socket and the jaw often closes with a snap—which is why the surgeon's thumbs are bandaged. If reduction is difficult an anaesthetic may be given.

After-treatment.—The patient must not open his mouth widely for two or three weeks.

DISSEMINATED SCLEROSIS—See Nervous System.

DIVERTICULITIS

As the cause of this is the burrowing of small, hard, faecal masses through the colonic mucous membrane at the attachment of the appendices epiploicae, the treatment is to wash them out by colonic lavage, and to prevent their forming again by keeping the motions soft and well lubricated, for which purpose liquid paraffin with or without agar agar is the best. The condition mostly affects the left side of the colon in stoutish, constipated, middle-aged or elderly men. It often has the symptoms of left-sided appendicitis and sometimes is diagnosed as cancer.

Operation is rarely necessary except in cases of obstruction, abscess or vesico-colic fistula.

DRESSINGS AND ACCESSORIES

DRESSINGS

(1) **STERILIZATION OF DRESSINGS**—See Nursing.

(2) **ANTISEPTIC DRESSINGS**

The following are the strengths of the medicated lint, gauzes, and wools.

Boric Lint (colour pink)	..	..	50 per cent.
Boric Wool (colour pink)	..	..	25 "
Carbolic Acid	..	..	5 "
Double Zinc Cyanide (colour violet)	..	..	3 "
Iodoform	..	..	5 to 10 "
Mercuric Chloride (Sublimite)	..	..	$\frac{1}{2}$ "
Mercuric Iodide	..	..	5 "
Picric Acid	..	..	$\frac{1}{2}$ "
Salicylic Acid	..	..	5 "
Sal. Alembroth (colour blue)	..	..	1 to 2 "
Zinc Sulphate	..	..	5 "

(3) INSTRUCTIONS FOR THE PREPARATION OF DRESSINGS LOCALLY.

IODOFORM OR BISMUTH GAUZE

Articles required :

- (1) Iodoform, 2 oz. or Bismuth subnitrate, 2 oz.
 - (2) Gauze, nine yards.
 - (3) Carbolic lotion, strength 1 in 40, 5 oz.
 - (4) Sunlight soap.
 - (5) Carbolic soap.
 - (6) Two basins.
- (a) Wash the gauze well in Sunlight soap to remove all starch, and keep it rolled, in one basin.
 - (b) In the second basin, carbolic soap is mixed with 5 oz. of carbolic lotion until a good lather is produced; add to this 1 oz. of iodoform and mix well.
 - (c) Rub this mixture into the gauze until the whole becomes yellow.
 - (d) Squeeze the lotion from the gauze and add the remaining ounce of iodoform and mix well, as before.
 - (e) Again saturate the gauze until the whole is well coloured.
 - (f) Finally, the gauze is not squeezed, but allowed to dry in the shade, and will be ready for use in 12 hours.

BORIC LINT

Articles required :

- | | |
|----------------------------|------------------|
| (1) Acid Boric, 1 lb. | (4) Hot water. |
| (2) Lint, 1 lb. | (5) Basins, two. |
| (3) Sunlight soap, 1 cake. | |

Method of preparing :

- (1) Wash the lint well in plain water, squeeze it out, and keep it rolled, in one basin.
- (2) In the second basin, 4 oz. of boric acid is well mixed with a pint of water. Sunlight soap is rubbed into this solution, until a good lather is produced.
- (3) Add another 4 oz. of boric acid to the solution.
- (4) Dip the lint in the solution until every part is well saturated, and then squeeze out the excess solution.
- (5) Add 4 oz. more boric acid to the solution, and rub in more Sunlight soap.

CATHETERS

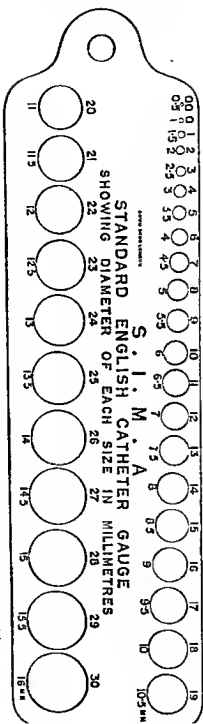


Fig. 4. A gauge showing the sizes of Catheters on the English standard, also the diameter in millimetres which multiplied by three gives the French gauge.

DRAINAGE TUBES

Red rubber, sizes Nos. 1-28.

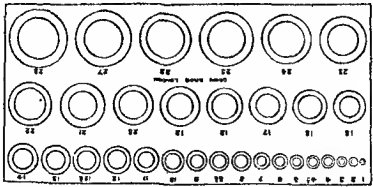


Fig. 5. To give the different sizes; approximately $\frac{1}{2}$ scale.

The French gauge refers to circumferences in millimetres; thus No. 6 French gauge means 6 mm. in circumference, or 2 mm. in diameter. The new English gauge No. 2 size is 2 mm. in diameter or 6 mm. in circumference.

PESSARIES

Circular pessaries are, generally speaking, made in sizes ranging from 2 in., and, increasing by $\frac{1}{8}$ in., to 3 $\frac{1}{2}$ in. outside diameter, and are numbered from one to twelve.

The Hodge type of pessary is measured at its greatest length, and made in sizes ranging from 2 in., increasing by $\frac{1}{8}$ in., to 3 $\frac{1}{2}$ in. in length, and numbered from one to twelve.

The sizes and their corresponding numbers are as follows:

Nos.	1	2	3	4	5	6	7	8	9	10	11	12
Sizes ..	2	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{3}{8}$	2 $\frac{1}{2}$	2 $\frac{5}{8}$	2 $\frac{3}{4}$	2 $\frac{7}{8}$	3	3 $\frac{1}{8}$	3 $\frac{1}{4}$	3 $\frac{1}{2}$ inches

DROPSY

The blood serum holds its fluid because normally it contains about 4.5% of albumin, which exerts just enough osmotic pressure to prevent transudation into the tissues; if the percentage drops below 2, fluid begins to escape from the capillaries and oedema occurs.

There may be an *absolute shortage of albumin* in the blood as in nephrosis, when most of it escapes in the urine. In starvation, when it is not swallowed, or in certain diseases, such as sprue, chronic enteritis, various chronic infections and possibly in cirrhosis and "back-pressure" liver due to heart disease, the albumin is not absorbed; "nutritional oedema", therefore, occurs. After severe burns, hæmorrhage or injury much of the albumin may have been lost in the blood or from oozing of serum, so again there is shortage of albumin, and oedema will develop in due course. Alternatively, there may be *relative shortage of albumin* due to increased

permeability of the capillaries after injury or in the presence of histamine; the albumin then escapes into the tissues, which upsets the intra : extravascular balance, so the tissues draw unauthorized fluid from the blood. A similar condition occurs when there is venous stasis, as in heart disease or constriction of a limb.

Salt retention in the tissues causes oedema, but its importance is debated, because although the osmotic power of the salt in the blood is about 1,000 times greater than that of the albumin, salt can easily pass through the capillary walls in either direction.

TREATMENT.—Obviously, the condition admits of treatment in two ways; the fluid loss can be enormously increased by a powerful diuretic such as the mercurial group—mersalyl, Neptal, Salyrgan, etc., or the albumin can be restored by the intravenous injection of plasma or, in cases of starvation, by an increased intake of albumin.

In cases of localized oedema it is usually enough to raise and rest the part, when the surplus fluid drains back into the circulation.

Peritoneal exudation (ascites) can be relieved by tapping or by mercurial diuretics, but these must be given with great caution in nephritic oedema, so even now Southey's tubes are occasionally used.

DROWNED, TREATMENT OF THE APPARENTLY

- (1) Try to hold the body upside down to let water run out of the mouth and throat. Sweep a finger rapidly round the pharynx to remove any obstruction, such as weed, then
- (2) Put the patient face down on the ground with a folded article of clothing under the lower part of the chest.
- (3) Place yourself over the patient, kneeling and facing his head.
- (4) Place the palms of the hands over the lower ribs one on each side, and throw forward the body weight so as to give firm pressure on the patient's chest.
- (5) Without removing the hands raise your body slowly, thus increasing the pressure.
- (6) Repeat this movement at the rate of 15 to the minute, until natural respiration restarts. Then turn the patient on the back, apply friction to the limbs, and hot bottles, and give an ounce of brandy and hot coffee by the mouth.
- (7) Continue for at least half an hour or until you are certain the patient is dead.

DRUG ERUPTIONS

(Based on Stelwagon and Morris)

ACETANILIDE.—Uncommon; slate-coloured cyanosis, especially of lips, face and extremities, erythema or erythematopapular eruption.

ANTIMONY (TARTAR EMETIC).—Rare; urticarial and vesico-pustular.

ANTIPYRIN.—Fairly common; erythematous eruption; considerable sweating, with great pruritus, and desquamation may follow. Rash resembles measles; on chest, abdomen and back.

ANTIOXIN.—Common; simple erythema, scarlatiniform, and the morbilliform and the scarlatiniform may or may not be followed by desquamation. There may be prodromal symptoms, or the onset may be sudden, with considerable fever and pain and swelling about the joints. The rash may appear shortly after the injection is administered, or not until several days later. Itching is variable in different cases. The eruption lasts usually from three or four days to a week or more.

ARSENIC.—Uncommon; almost every form of cutaneous eruption has resulted from the internal use of this drug—erythematous, papular, vesicular, urticarial, pustular, petechial, erysipelous, herpetic, funicular, carbuncular, ulcerative and gangrenous. A peculiar brownish discoloration with general thickening of the epidermis in the palms and soles.

BELLADONNA — ATRAPINE. —Common, especially in children; generally erythematous in type, as a rule diffuse and closely resembles the exanthem of scarlet fever.

BORIC ACID.—Rare; erythematous rash or eruption like psoriasis.

BROMINE COMPOUNDS.—Frequent; bromide acne, a papulo-pustular eruption about the regions of the face and shoulders and back, with preference for hairy parts; the lesions are usually discrete. **CHLORAL.**—Not uncommon; most frequently a scarlet-fever-like rash, usually accompanied with febrile reaction, and congestion of mucous membranes. The taking of food, tea or alcohol has a marked effect in intensifying and extending the eruption.

COPAIBA.—Common; most of the rashes observed from the constant administration of copaliba and cubeba are due to this drug; erythematous, or papular forms generally seen round the wrists, ankles and knees.

ERGOT.—Uncommon, and usually only after prolonged administration. Vesicular, petechial, pustular, funicular and gangrenous—this last on the extremities and usually circum-

IODINE AND ITS COMPOUNDS (USUALLY THE IODIDE SALTS).—Very common; iodide acne, a papulo-pustular or pustular eruption, generally seen on face, shoulders, and back, although it may be more or less scattered; usually appears within a week of commencement of administration.

As in bromide eruptions, the eruptive tendency may persist for some time after the drug is discontinued, more especially in children; rarely it does not appear until after the cessation of the drug. Iodide eruption has been sometimes seen in nursing infants, to whose mothers the drug was being administered. The essential lesion in eruptions, due to the iodides and bromides, is a dermatitis showing a tendency to localization about the sebaceous glands.

IODOFORM.—Infrequent; in addition to the dermatitis and eczematous eruptions produced directly by the application of this drug, rashes may follow its absorption, and are generally erythematous, papular, vesicular or bullous, with or without intense itching. Serious constitutional symptoms can also result. Delirium, nephritis, and death have been observed, especially after application to burns.

IPECACUANHA.—Not common; circumscribed erysipelatous patches of more or less general distribution.

MERCURY.—Exceptional; may produce almost any kind of skin lesion, erythematous, scarlatiniform, papular, pustular, herpetic, bullous, furuncular, and ulcerative. Almost all, more especially the severe forms, result from overdosing, and are rarely seen at the present day.

OPIUM (MORPHINE).—Rare; mostly scarlatiniform, sometimes morbilliform, and polymorphous types, usually with intense itching, desquamation is the rule; less frequently urticarial, or carbuncular. Quickly disappears on stopping the drug.

QUININE (CINCHONA).—Infrequent; mostly eczematous in character; erythematous, scarlatiniform, with or without desquamation, may follow hypodermic use; less frequently urticarial, lichenoid, bullous, and gangrenous (especially of scrotum). In the scarlatiniform and other types of general distribution there may be considerable constitutional disturbance, but usually the eruption is not accompanied by fever.

SALICYLIC ACID (SALICYLATES).—Not common; usually erythematous, urticarial and pemphigoid, with or without desquamation.

SILVER NITRATE.—Slate-coloured and greyish pigmentation or discoloration after prolonged use.

STRYCHNINE (NUX VOMICA).—Rare; miliary or scarlatiniform, with pruritus and formication.

SULPHONAL.—Occasional; most commonly erythematous and scarlatiniform, with desquamation and intense itching.

TUBERCULIN.—Rare, diffuse scarlatiniform or morbilliform eruption, with or without subsequent desquamation.

TURPENTINE—TEREBENE.—Occasional; erythematous, scarlatiniform and morbilliform; exceptionally vesicular and papular, or eczematous in character. Terebene, bright red papular rash.

DRUG HABIT—See Mental Diseases.

DRUGS (See also Chemotherapy ; Insomnia (Barbiturates).)

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CARBOLIC GARGLE

R Acid. Carbol. Liq.
Liquor. Potassae
Tinct. Lavand. Co.
Glycerini	5ij
Aq. ad	..	..	..	..	5viij

To be used with an equal amount of hot water.

POWDERS

PRICKLY HEAT		equal parts of each	MACLEANS	
R Zinc Oxide	..		R Bismuth, Carb.	..
Starch	Sod. Bicarb.	..
Boric Acid	Mag. Carb.	..

CHILDREN'S DIARRHOEA MIXTURE

R Ol Ricini	..	℥ 40
Mucilag.	..	q.s.
Aq Anethad	..	3ss

3ss t.d.s. or oftener.

CHILDREN'S COUGH MIXTURE

R Ammon. Carb.	..	..	gr. 1
Pot. Cit.	..	..	gr. 5
Tinct. Ipecac.	..	..	℥ 3
Aq. Anethi ad	..	..	3j

ADDITIONAL PRESCRIPTIONS

ABDOMINAL TUBERCULOSIS

R Oleum Morrhuæ	..	℥ 40	When the stools are loose and
Iodoform.	..	gr. 4	offensive.
Tr Lavandulæ Co	..	℥ 6	
Mucilag	..	q.s.	
Aq. Menth. Pip. ad	..	3j	R Hydrag. cum Creta .. gr. 1-2
t d s p c			Sod. Bicarb. .. gr. 4

ACNE VULGARIS

Sulphur is the most important drug in treatment.

R Sulphur Praecipitata	..	..	gr. 35
Spiritus Camphoræ	..	..	℥ 30
Aquam Calcis ad	..	..	3j

ACIDOSIS

To lessen the occurrence of Acidosis

after an anaesthetic in children.

R Pot Bicarb	..	gr. 12
Sod. Bicarb	..	gr. 12
Calc. Carb	..	gr. 6
Mag. Carb.	..	gr. 6
Aquam ad	..	3j

Acidosis in Asthma.

Examine the urine for diuretic acid. It is more frequent in children.

Give Glucose with:

Sod. Bicarb.	..	..	3j
Pot. Cit.	..	..	3ss

ADENOIDS

If for any reason an operation cannot be performed.

R Resorcin	..	..	..	gr. 5-10
Tr Hamamelis	..	..	..	℥ 30
Normal Saline ad	..	..	..	3j

Instil 5 or 6 drops into the nose with the child lying on its back.

ALBUMINURIA, CYCLICAL, IN CHILDREN

R Amm. Bromid.	..	..	..	gr. 4
Pot. Bromid.	..	..	..	gr. 4
Liq Arsenicalis	..	..	..	℥ 2
Sodu Hypophosphitis	..	..	..	gr. 3
Aquam Chloroformi	..	..	..	3ss
Aquam Menth. Pip.	..	..	..	3ss

Two to four teaspoonsfuls t.d.s. (*H. C. Cameron*)

ANOREXIA

B Tr. Nuc. Vom.	℥ 7				
Tr. Cinchonae	℥ 30				
Tr. Calumbae	℥ 30				
Tr. Gentianae	℥ 3j				
In water before meals.					
B Sod. Bicarb.	℥ 15				
Tr. Nuc. Vom.	℥ 7				
Tr. Gentian.	℥ 3j				
Aqua. Chloroformi ad	℥ 3j				
A dose before each meal.					

ARTERIO-SCLEROSIS AND HIGH BLOOD-PRESSURE

B Pot. Iodid.	℥ 12				
Liq. Arsenicæ	℥ 4				
Tr. Nuc. Vom.	℥ 6				
Aqua. Menth. Pip. ad	℥ 3ss				
t.d.s p.c.					

ASTHMA

B Liq. Ext. Grindelæ	℥ 20				
Pot. Iodid.	℥ 2				
Trinitin.	℥ 15				
Tr. Euphorb. Pulvif.	℥ 20				
Aqua ad	℥ 3ss				
A dose every 2 hours until relieved					
B Liq. Ext. Grindelæ	℥ 20				
Tr. Belladonnæ	℥ 7				
Sod. Bromid.	℥ 12				
Mucilag. Acaciæ.	℥ 3j				
Aqua Chloroformi ad	℥ 3j				
A dose every 2 hours until relieved.					

To prevent attacks

B Tr. Stramonii	℥ 5				
Tr. Belladonnæ	℥ 5				
Pot. Iodid.	℥ 2				
Tr. Lobelia. Acib.	℥ 3				
Syrup. Aurantii	℥ 3j				
Inf. Genian. Co. ad	℥ 3j				
Each prescription an ounce t.d.s p.c.					

BRONCHITIS, ACUTE

<i>Diaphoretic in early stages</i>					
B Liq. Amm. Acet.	℥ 5ss				
Tr. Ipecac.	℥ 5				
Sp. Aeth. Nit.	℥ 20				
Tr. Camph. Co.	℥ 15				
Aqua. Chloroformi ad	℥ 3j				
Every 3 hours with water.					
<i>Expectorant for the later stages</i>					
B Amm. Carb.	℥ 5				
Tr. Ipecac.	℥ 10				
Tr. Scillæ	℥ 15				
Tr. Chlorof. et Morph. Co.	℥ 10				
Syrup. Tolu.	℥ 30				
Aqua Chloroformi ad	℥ 3ss				
Every 3 hours in water.					

BRONCHITIS, CHRONIC

B Vinum Ipecac.	℥ 7				
Amm. Chlorid.	℥ 12				
Mist. Ammoniac	℥ 5j				
Syrup. Tolu.	℥ 3j				
Aqua. Amisi ad	℥ 3j				
t.d.s.					
B Tr. Benzoin. Co.	℥ 8				
Tinct. Ipecac.	℥ 8				
Syrup. Pruni Virg.	℥ 8ss				
Mucilag. Acaciæ	℥ 8ss				
Aqua. Amisi ad	℥ 3j				
In water t.d.s.					
<i>In water every 4 hours.</i>					
B Oleum Cubebæ	℥ 2				
Tr. Senegæ	℥ 15				
Tereben	℥ 3				
Mist. Amygdal. ad	℥ 3ss				

DIARRHOEA

<i>Diarrhoea after an opertent</i>		
<i>Excessive Peristalsis</i>		
<i>B. Bari Sulph.</i>	gr. 10	Tr. Kino ..
<i>Acid. Sulph. Aromat.</i>	℥ 10	Tr. Catechu ..
<i>Tr. Opil ..</i>	℥ 8	Mist. Cretae ..
<i>Oleum Cinnamon.</i>	℥ 4	Aqua. Cinnamon. ad
<i>Aquum ad</i>	℥ 3ss	
A tablespoonful every three hours.		
A tablespoonful every four hours in water.		

Lead Acetate as a powerful astringent

<i>B. Plumbi Acetatis ..</i>	gr. 2	<i>One pill twice daily.</i>
<i>Liq. Morph. Acet.</i>	℥ 15	
<i>Acid. Acetici ..</i>	℥ 15	
<i>Aquum ad</i>	℥ 3j	
t.d.s.		

DUSTING POWDERS

<i>Stimulating Antiseptic</i>		
<i>B. Calomet ..</i>	℥ 1j	
<i>Boric Acid ..</i>	℥ 1j	
<i>Bismuth. Subnit.</i>	℥ 1j	
<i>Boric Acid ..</i>	℥ 1j	
<i>Salicylic Acid ..</i>	℥ 1j	
<i>French Chalk ..</i>	℥ 1j	
<i>Boric Acid ..</i>	℥ 1j	
<i>Morph. Hydrochlor.</i>	℥ 1j	
<i>Boric Acid ..</i>	℥ 1j	
<i>Tannic Acid ..</i>	℥ 1j	
<i>Borax ..</i>	℥ 1j	
<i>Morph. Hydrochlor.</i>	℥ 1j	

ENEMATA

<i>B. Starch ..</i>	gr. 120	<i>B. Starch Enema ad</i>
<i>B. Purified Ox Bile ..</i>	gr. 30	<i>B. Olive Oil ..</i>
<i>Soap Enema ..</i>	gr. 30	<i>B. Water ..</i>
<i>B. Castor Oil ..</i>	℥ 3j	<i>B. Tr. Opil ..</i>
<i>Olive Oil ..</i>	℥ 3iv	<i>Mucilage of Starch ..</i>
<i>B. Soft Soap ..</i>	℥ 3j	<i>B. Oil of Turpentine ..</i>
<i>Water ..</i>	℥ 3xv	<i>Mucilage of Starch ..</i>

EYE DROPS

<i>B. Novocain ..</i>	gr. 4	<i>B. Cocain. Hydrochlor.</i>
<i>Zinc. Sulph.</i>	gr. 4	<i>Boric Acid ..</i>
<i>Liq. Hydrarg. Perchlor.</i>	℥ 15	<i>Liq. Adrenalin. Hydrochlor.</i>
<i>Aqua. Camph.</i>	℥ 3j	<i>Rose Water ad</i>
<i>Aqua. Destillat. ad</i>	℥ 3j	
<i>B. Acid. Tannici ..</i>	gr. 4	<i>B. Zinc. Sulph.</i>
<i>Zinc. Sulph.</i>	gr. 4	<i>Sod. Biorat.</i>
<i>Aqua. Camph.</i>	℥ 3j	<i>Aqua. Destill.</i>
<i>B. Acid. Hydrocyan. Dil.</i>	℥ 4	<i>B. Argemol ..</i>
<i>Borax ..</i>	gr. 4	<i>Aqua. Destillat.</i>
<i>Sod. Bicarb.</i>	gr. 4	
<i>Aquum ad</i>	℥ 3j	

For Conjunctivitis

<i>B. Acid. Tannici ..</i>	gr. 4	<i>B. Zinc. Sulph.</i>
<i>Zinc. Sulph.</i>	gr. 4	<i>Sod. Biorat.</i>
<i>Aqua. Camph.</i>	℥ 3j	<i>Aqua. Destill.</i>
<i>B. Acid. Hydrocyan. Dil.</i>	℥ 4	<i>B. Argemol ..</i>
<i>Borax ..</i>	gr. 4	<i>Aqua. Destillat.</i>
<i>Sod. Bicarb.</i>	gr. 4	
<i>Aquum ad</i>	℥ 3j	

For Refraction Cases

<i>B. Cocain. Hydrochlor.</i>	gr. 1	
<i>Homatropin. Hydrobrom.</i>	gr. 2	
<i>Ag. Destillat.</i>	℥ 3j	

One drop is instilled every 7 minutes for 3 or 4 doses. The eye is ready for examination half an hour after the final dose.

EYE OINTMENTS

- R Hydrarg. Ammoniat. .. gr. 1 R Yellow Oxide of Mercury
 Adeps. 3j 1 to 2 per cent.
 For chronic conjunctivitis, phlyctenular and interstitial keratitis, blepharitis
 and opacities of the cornea.

EXOPHTHALMIC GOITRE (GRAVES'S DISEASE)

- R Acid. Hydrobrom. Dil. .. ℥ 12 R Pot. Bromid. gr. 12
 Quinin Hydrobrom. .. gr. 6 Tr. Belladonn. ℥ 8
 Syrup Auranti 3j Liq. Arsenicalis ℥ 4
 Aquam ad 3j Aqua. Chloroformi ad .. 3j

Each prescription, two tablespoonfuls t.d.s.p.c.

GARGLES

- R Sod. Benzoat. 5iss R Acid. Carbol. gr. 50
 Sod. Bromid. 5iss Sod. Biborat. gr. 60
 or Resorcin 5iss Pot. Brom. gr. 60
 Phenazon 5iss Sp. Menth. P.p. 3ss
 Sp. Menth. Pip .. ℥ 30 Glycenn. ad 3iv
 Glycerin. 3iv
 A teaspoonful in $\frac{1}{2}$ glass of warm water. A teaspoonful in $\frac{1}{2}$ tumbler of tepid water.

The above are prescriptions by Sir St. Clair Thomson.

- R Pot. Chlor gr. 12 R Lotio Hydrarg. Nigra .. 3j
 Sod. Bicarb gr. 6 Pot. Chlorat. gr. 10
 Pot. Bicarb gr. 6 Aquam ad 3j
 Aquam ad 3j

GASTRALGIA

*Gastralgia and Vomiting**Hysterical Gastralgia*

- R Menthol gr. 24 R Chloral. Hydras. gr. 40
 Cocainae Hydrochlor. .. gr. 10 Calcii Bromid. 5iss
 Sp. Vin. Rect. 3ij Codeinæ gr. 3
 Syrup 3iss Aqua. Lauracerat. .. 3ij
 One teaspoonful every one to two hours (Burney Yeo) Aquam ad 3vi
 A tablespoonful every 4 hours. (Barrey Yeo)

- R Liq. Opii Sedativi 5-8
 Sp. Amm. Aromat. ℥ 30
 Aqua. Carui ad 3j

A dose when pain is severe. (Burney Yeo)

GASTRITIS, CHRONIC

For Fermentation

- R Creosoti ℥ 1 R Tr. Rhei Co. ℥ 20
 Pulv. Rhei gr. 14 Sod. Bicarb. gr. 12
 Pulv. Calumbæ gr. 14 Tr. Zingibers 5ss
 Pulv. Saponis gr. 4 Inf. Gentian. Co. ad .. 3j
 The pill after food. (Burney Yeo) t d.s.p.c.

GASTRITIS, CHRONIC, IN CHILDREN

- R Sod. Bicarb gr. 2 R Pulv. Rhei gr. 2-3
 Pulv. Rhei gr. 1 Hydrarg. cum Creta. .. gr. $\frac{1}{2}$ -1
 Hydrarg. Subchlor. .. gr. $\frac{1}{4}$ Every night for a week.
 Sacch. Alb gr. 5 (Hutchison)

GLANDS

Acutely swollen Cervical Glands

R. Pot. Iodid. gr. 15

Iodin. gr. 12

Glycerin. ʒi

Aquam ad ʒi

Apply twice daily to the pharynx with a brush.

R. Tr. Ferri Perchlor. m 5-8

B. Oleum Morrhuae m 30

Cresosol m 1

For one capsule; two capsules twice daily.

HEPATIC DISTURBANCES

B. Euonymum. gr. 1

Podophyllum. gr. 1

Pil. Rhei Co. gr. 1

Pil. Colocynth. Co. gr. 1

Ext. Hyos gr. 1

The pill to be taken at bedtime occasionally.

B. Tr. Podophyllin. m 5

Sod. Phosphatis m 15

Sp. Amm. Aromat m 15

Aqua. Chloroformi ad ʒi

To be taken in the early morning in a small tumbler of water.

B. Sod. Sulph. ʒi

Acid. Hydrochlor. Dil m 10

Spirit. Chloroform m 10

Aqua. Menth. Pip. ʒi

To be taken in the early morning in a small tumbler of water.

B. Tr. Benzoin. Co. m 60

Menthol. gr. 3

Oleum Eucalypti m 3

A teaspoonful to a pint of water at 150° F.

B. Glycerin. Carbolic. ʒi

Sp. Camphorae ʒi

Tr. Benzoin. Co. ʒi

Sp. Chloroformi ʒss

B. Quinin. Sulph. gr. 1

Sod. Salicylat. gr. 10

Pot. Cit. gr. 20

Syrup. Auranti ʒss

Aqua. Chloroformi ad ʒi

Every 4 hours.

B. Sod. Salicylat. gr. 15

Tr. Nuc. Vom. m 7

Liq. Arsenicalis m 2

Liq. Sarsae Co. ʒiv

Aquam ad ʒi

i.d.s. (Shaw's Mixture.)

JOINTS

The following may be tried in all cases of doubtful joint trouble :

B. Pot. Iodid. gr. 5

B. Pot. Iodid. gr. 12

Tr. Nuc. Vom. m 7

Liq. Arsenicalis m 2

Liq. Sarsae Co. ʒiv

Aquam ad ʒi

i.d.s. (Shaw's Mixture.)

LINIMENTS

Liniment. Mentholis Co.

R Methyl Salicylate	..	20 parts	R Menthol	..	..	8 parts
Menthol	..	10 parts	Chloroform	..	..	4 parts
Chloroform	..	10 parts	Olive Oil	..	..	10 parts
Camphor	..	10 parts				
Eucalyptus Oil	..	10 parts	R Linimentum Capsici			
Turpentine Oil	..	10 parts	Painted on the skin or sprinkled			
Belladonna Lin.	..	15 parts	on flannel, it produces a red glow			
Lavender Oil	..	5 parts	within an hour. Its action can be			
Liq. Paraffin to	..	100 parts	arrested by smearing with Vaseline,			

(Martindale.)

R Menthol	..	2 parts	R A.B.C. Liniment.			
Aconite Liniment	..	1 part	Equal parts of Liniments of Aconite,			
Chloroform	..	4 parts	Belladonna and Chloroform.			
Soap Liniment	..	32 parts				
R Lin. Camph. Co.	..	3j	R Oleum Terebinthinae	..	3j	
Lin. Saponis	..	3j	Lin. Belladonnae	..	3j	
Lin. Aconiti	..	3j	Lin. Saponis	..	3j	

* MOUTH WASHES

R Glycerin. Acid. Carbol.	3ss	R Pot. Chlor.	..	3ij
Sod. Bicarb.	.. 3ij	Pot. Bicarb.	..	3j
Aquam ad.	.. 3vij	Sod. Bicarb.	..	3j
		Aquam ad.	..	3xii
R Acid Salicylic	.. gr. 20	R Pot. Chlor.	..	gr. 45
Acid. Benzoici	.. gr. 20	Sod. Biborat.	..	gr. 45
Saccharini	.. gr. 2	Citric Acid	..	gr. 30
Glycer. Boracis	.. 3iss	Ess. Limonis	..	℥ 5
Glycer. Acid. Carbolic	.. ℥ 30	Glycerin.	..	3v
Sp. Vini Rectificati	.. 3j	Aquam ad.	..	1 pint
Eau-de-Cologne ad.	.. 3iv			

Two teaspoonfuls in 5 ounces of warm water.

When ulceration is present

R Hydrogen Peroxide (20 Vols)	.. 500 parts	R Pot. Chlor.	..	3ij
Oleum Menth. Pip.	.. 1 part	Borax	..	3ij
Saccharin. Eluxr	.. 30 parts	Sanitas	..	3iv
Thymol Water	.. 470 parts	Aquam ad.	..	3xvj

NASAL WASHES

R Sod. Bicarb.	..	gr. 5	R Sod. Bicarb.	..	gr. 3
Sod. Biborat.	..	gr. 5	Sod. Biborat.	..	gr. 3
Sod. Chlor.	..	gr. 5	Acid. Carbolic.	..	gr. 1
Sacchari Alb.	..	gr. 5	Sacchari Alb.	..	gr. 5
One powder to be added to 3 oz. of water.			Aquam ad.	..	3j
			Equal parts to be used with water.		

R Sod. Bicarb.	3ii	R Pot. Chlor.	3iv	Sacch. Alb.	3j
Sod. Biborat.	3ii	Pot. Bicarb.	3iv	..	3j
Listerine	3j	..	3iv	..	3j
Glycerin.	3iv	..	3iv	..	3j
One drachm to be added to 2 oz. of water.					
water.					

All the above are prescriptions by Sir St. Clair Thomson.

R Sod. Chlorid.	7	..	7	..	7
Boracis	2i	..	2i	..	2i
Acid. Boric	4	..	4	..	4
Sod. Benzoat.	4	..	4	..	4
Menthol.	4	..	4	..	4
Thymol.	4	..	4	..	4
Betacain. Hydrochlor.	4	..	4	..	4
Oleum Gaultheriae	4	..	4	..	4
To one crushed tablet add from 1 to 3 oz. of water.					

NERVOUSNESS

Nervous excitable patients with restless nights

Nerve Sedative

R Amm. Bromid.	3	R Zinci Valerianatis	3	Ext. Hyos.	3
Sod. Bromid.	3	..	3	..	3
Pot. Bromid.	3	..	3	..	3
Liq. Arsenicalis	3	..	3	..	3
Syrup. Pruni Virg.	3	..	3	..	3
Aquum ad	3ss	..	3ss	..	3ss
A tablespoonful in water, 4 s p c.					
R Tr. Digitalis	2	..	2	..	2
Tr. Belladonn.	2	..	2	..	2
Tr. Aconit.	2	..	2	..	2
Inf. Gentian. Co. ad	3ss	..	3ss	..	3ss
rds.					

Nervous Palpitation

One pill twice daily.

Throat Pains

PAINTS

R Bismuth. Carb.	20	..	20	..	20
Liq. Ext. Hyos.	6	..	6	..	6
Pulv. Trag. Co.	6	..	6	..	6
Aquum ad	3ss	..	3ss	..	3ss
Taken 10 minutes before meals.					

Women who complain of a lump in the throat

R Carbolie Acid	gr. 10-12	R Iodid.	gr. 6	..	gr. 6
Tr. Iod.	80	..	80	..	80
Glycerin. ad	3j	..	3j	..	3j
R Potassium Alum. (Iron-free)	1 part	..	1 part	..	1 part
Glycerin.	6 parts	..	6 parts	..	6 parts
dissolve with heat; then add	1 part	..	1 part	..	1 part
Tannic Acid	1 part	..	1 part	..	1 part
Mandri's Paint.					

Analgesic Powders

B Oleum Camphorae ..	..	℥j	B Menthol ..	..	..	1 part
Chloroform ..	..	℥j	Thymol ..	..	..	1 part
Oleum Menth. Pip. ..	..	℥ij	Chloral Hydrate ..	..	..	1 part
Lin. Aconit ..	..	℥ij	Camphor ..	..	..	3 parts

SPONGY GUMS

B Tr. Myrrhæ ..	..	℥iv	B Pulv. Myrrhæ ..	..	℥j
Tr. Kino ..	..	℥iv	Pulv. Kraamenæ ..	..	℥ij
Glycerin. Acid. Boric. ..	..	℥j	Pulv. Camphoræ ..	..	℥j
Aqua. Coloniensis ..	..	℥ij	Cretæ Precip. ..	..	℥ij

A teaspoonful in a wineglass of water for brushing the teeth and rinsing the mouth night and morning.

Use as a dentifrice twice daily.

STIMULANTS

The following are powerful and diffusible stimulants which would not be recognized as alcohol:

B Tr. Aurantii ..	..	℥ij	B Sp. Aetheris Nit. ..	..	℥ 30
Sp. Aetheris ..	..	℥ss	Sp. Amm. Aromat. ..	..	℥ 30
Sp. Amm. Aromat. ..	..	℥ss	Sp. Armoracæ Co. ..	..	℥ 30
Tr. Nuc Vom. ..	..	℥ 10	Aqua. Camph. ad ..	..	℥j
Aqua. Chloroformi ad ..	..	℥j			

B Liq. Ext. Kolas ..	..	℥ss
Ext. Carni ..	..	℥ 10
Ext. Malti ..	..	℥j
Vinum Cocæ ad ..	..	℥j

Three or four times daily.

STOMATITIS

See Mouth Washes

STYPTICS

A useful Styptic

B Acid. Benzoici ..	..	..	..	..	5 parts
Acid. Tannici ..	..	..	..	..	10 parts
Balsam. Peru. ..	..	..	..	..	2 parts
Collodii Flex. ..	..	..	..	..	83 parts

SUNBURN

The Lotion

B Hydrarg. Perchlor. ..	..	gr. 2
Glycerum ..	..	℥ss
Tr. Benzoin. Simp. ..	..	℥j
Amygd. Amaræ ..	..	℥ij
Aqua. Sambuci ad ..	..	℥viij

The Lotion

B Glycerin. Plumbi Subacet. ..	..	℥iv
Aqua. Laurocerasi ..	..	℥j
Aqua. Rosæ ad ..	..	℥viij

SUPPOSITORIES

B Liquid Ext. Belladonna ..	..	℥ 2½	B Morphine Hydrochloride ..	..	gr. ½
Oil of Theobroma ..	..	to gr. 15	Oil of Theobroma ..	..	to gr. 15
B Cocaine Hydrochloride ..	..	gr. ½	B Tannic Acid ..	..	gr. 3
Oil of Theobroma ..	..	to gr. 15	Oil of Theobroma ..	..	to gr. 15
B Glycerine ..	..	gr. 42	B Hamamelin ..	..	gr. 3
Gelatin ..	..	gr. 8½	Zinc Oxide ..	..	gr. 10
Water ..	..	to gr. 60	Oil of Theobroma ..	..	to gr. 30
B Iodoform ..	..	gr. 3	B Lead Acetate ..	..	gr. 3
Oil of Theobroma ..	..	to gr. 15	Opium ..	..	gr. 1
			Oil of Theobroma ..	..	to gr. 15

SWEATING

Sweating feet

B Pulv. Alum. Opt.	gr. 20	3ss
Talc. Pulv.	3ss	3ss
Zinc. Carb.	3ss	3ss
Zinc. Oxid.	3ss	3ss

Sweating axillæ

B Acid. Salicyl.	gr. 12	3ss
Pulv. Amyli Opt.	gr. 3	3ss
Pulv. Aluminis	gr. 3	3ss
B Alumin. Sulph.	gr. 40	3ss
Aq. Rosæ ad	3ss	3ss

dose after breakfast and lunch.
Depression after influenza, etc. A

B Alumin. Sulph.	gr. 40	3ss
Aq. Rosæ ad	3ss	3ss

Sweating hands

B Tannin	gr. 20	3ss
Spt. Rectif.	3ss	3ss
Eau-de-Cologne	3ss	3ss
Aquam ad	3ss	3ss
B Liq. Strychnin.	gr. 3	3ss
Acid. Phosph. Dil.	gr. 12	3ss
Tr. Belladonn.	gr. 3	3ss
Tr. Digitalis	gr. 3	3ss
Syrup. Auranti	gr. 3	3ss
Aqua. Chloroformi ad	3ss	3ss
To check sweating from Nervous	3ss	3ss
Depression after influenza, etc. A	3ss	3ss

TONICS

B Acid. Phosph. Dil.	gr. 15	3ss
Tr. Ferri Perchlor.	gr. 10	3ss
Spt. Chloroform.	gr. 10	3ss
Inf. Quassia ad	3ss	3ss
B Ferri Amm. Cit.	gr. 5	3ss
Liq. Amm. Fort.	gr. 14	3ss
Spt. Myrticæ	gr. 5	3ss
Inf. Calumbæ ad	3ss	3ss
B Phosphorus	gr. 12	3ss
Quinin. Sulph.	gr. 12	3ss
Strychninæ	gr. 12	3ss
Phosphorus	gr. 12	3ss
Ferr. Sulph. Exsic.	gr. 12	3ss
Pol. Coloc. et Hyos.	gr. 12	3ss
B Sod. Sulph.	gr. 15	3ss
Liq. Strychnin.	gr. 15	3ss
Liq. Ext. Cascara	gr. 15	3ss
Tr. Cardam. Co.	gr. 15	3ss
Aqua. ad	gr. 15	3ss
B Liq. Strychninæ Hydro-	gr. 4	3ss
chlor.	gr. 4	3ss
Acid. Phosph. Dil.	gr. 15	3ss
Quinin. Hydrochlor.	gr. 1	3ss
Liq. Arsemic. Hydrochlor.	gr. 4	3ss
Tr. Gentian. Co.	gr. 30	3ss
Syrup. Limonis	gr. 30	3ss
Aqua. Chloroformi ad	gr. 30	3ss
A tablespoonful in water t d s.	gr. 30	3ss
B Ferri Amm. Cit.	gr. 8	3ss
Tr. Quininæ	gr. 8	3ss
Syrup. Auranti	gr. 30	3ss
Inf. Auranti Co. ad	gr. 30	3ss
B Ferri Amm. Cit.	gr. 10	3ss
Liq. Bismuthi et Amm. Cit.	gr. 10	3ss
Liq. Fowleri	gr. 10	3ss
Aquam ad	gr. 10	3ss
B Tr. Quininæ	gr. 30	3ss
Acid. Hydrobrom. Dil.	gr. 30	3ss
Mag. Sulph.	gr. 20	3ss
Tr. Nuc. Vom.	gr. 3	3ss
Syrup. Zingiberis	gr. 30	3ss
Aqua. Dest. ad	gr. 30	3ss
Nerve tonic, t d s.	gr. 30	3ss

TONICS FOR CHILDREN

The following are useful:

R Tr. Nuc. Vom.	℥ 1½	R Acid. Nitric. Dil.	℥ 1½
Acid. Nitro-Hyd. Dil.	℥ 1½	Glycerin.	℥ 10
Inf. Gentian. Co. ad	℥ 1	Inf. Calumbae ad	℥ 1
t.d.s.		t.d.s.	
R Liq. Ferri Perchlor.	℥ 2	R Ferri Amm. Cit.	gr. 2
Glycerin	℥ 5	Pot. Cit.	gr. 2
Inf. Quassiae ad	℥ 1	Glycerin.	℥ 10
t.d.s.		Inf. Calumbae ad	℥ 1
		t.d.s.	
R Mag. Sulph.	gr. 5.	R Liq. Strych. Hyd.	℥ ½
Acid. Sulph. Dil.	℥ 1	Acid. Phosph. Dil.	℥ 5
Ferr. Sulph.	gr. 1	Tr. Gent. Co.	℥ 10
Syrup Zingib.	℥ 2	Aqua. Carui ad	℥ 1
Aquam ad	℥ 1	t.d.s.	
t.d.s.			

TOOTHACHE

R Acid. Carbolic Cryst.	gr. 1	R Acid. Carbolic.	gr. 1
Chloral. Hydras	gr. 1	Cocain. Hydrochlor.	gr. 1
Camphorae	gr. 1	Mix and place in hollow tooth,	
Thymol	gr. 1	protect with wool and gutta-percha	
To be applied to the hollow tooth		stopping.	
on a plug of cotton-wool.			

TEETHING

For Infants when teething

R Pot. Bromid.	gr. 2
Syrup. Papav. Alb.	℥ 5
Aqua. Anethi ad	℥ 1

A teaspoonful occasionally.

URINARY ANTISEPTICS

The following are useful prescriptions for giving urinary antiseptics.

R Hexamin	gr. 10	R Pot. Citrat.	℥ 1
Syrup. Aurantu	℥ ss	Tr. Hyos.	℥ ss
Aqua. Dest ad	℥ 1	Emuls. Chloroformi	℥ 10
Every 4 hours.		Inf. Buchu ad	℥ 1
		t.d.s.p.c.	

R Hexamin.	gr. 12	R Hexamin.	gr. 12
Sod. Phosp. Acid.	gr. 15	Sod. Benzoat.	gr. 12
Tr. Hyos.	℥ ss	Sp. Chloroformi	℥ 10
Sp. Chloroformi	℥ 15	Inf. Buchu ad	℥ 1
Inf. Buchu ad	℥ 1	t.d.s.p.c.	
t.d.s.p.c.			

VAGINAL DOUCHES

Antiseptic Douches

(1) Lysol	℥ 1—Oj
(2) Cyllin	℥ ss—Oj
(3) Izal	℥ 1—Oj
(4) Sanitas	℥ 1—Oj
(5) Tr. Iodine	℥ 1—Oj
(6) Perchloride of Benzoidine	
of Mercury . both 1 in 4,000	

Astringent Douches

(1) Aluminis	℥ 1—Oj
(2) Zinc Sulphate	℥ 1—Oj
(3) Tannin	℥ ss—Oj

Sedative Douches

(1) Sod. Bicarb.	℥ 1—Oj
(2) Tr. Opi	℥ 1—Oj
(3) Chloral Hydras	℥ ss—Oj
(4) Liq. Plumbi Subacetatis	℥ ss—Oj

A useful formula is:

R Pot. Chlorid	gr. 3
Sod. Chlorid.	gr. 50
Sod. Sulphas	gr. 2½
Sod. Carb.	gr. 2½
Sod. Phosph.	gr. 2

To a pint of hot water.

Fœtid Discharge

℞ Glycerini Acidi Tannici ʒvi
 Glycerini Acidi Carbolic ʒij
 A teaspoonful to be added to a pint of lukewarm water and used as a douche every morning.

VAGINAL TAMPONS

The tampons may be made in the form of a rope, pledgets of cotton-wool used in the form of a kite's tail, strips of medicated gauze, or a single ball of wool.

The following are employed for soaking the plugs:

Glycerine;
 or Boroglyceride.
 or ℞ Ichthyol Ammon.
 Glycerine ad
 One or two ounces on plugs.
 ʒi
 ʒix

TABLE OF PROPORTIONATE DOSES FOR
DIFFERENT AGES

ADULT DOSE			
1 lb. oz.	60 gr.	20 gr.	Dose

Age		Dose	
1 Month	..	30 min.	3 gr.
3 Months	..	40 min.	4 gr.
6 Months	..	40 min.	6 gr.
9 Months	..	40 min.	7 gr.
1 Year	..	1 lb. dr.	8 gr.
2 Years	..	1½ lb. dr.	10 gr.
3 Years	..	1½ lb. dr.	12 gr.
4 Years	..	2 lb. dr.	15 gr.
5 Years	..	2½ lb. dr.	18 gr.
6 Years	..	3 lb. dr.	20 gr.
8 Years	..	4 lb. dr.	30 gr.
10 Years	..	4½ lb. dr.	35 gr.
12 Years	..	5 lb. dr.	40 gr.
13 Years	..	5½ lb. dr.	45 gr.
15 Years	..	6 lb. dr.	45 gr.
18 Years	..	6½ lb. dr.	45 gr.
20 Years	..	7 lb. dr.	50 gr.
20 to 45 Years	..	1 lb. oz.	60 gr.
50 Years	..	7 lb. dr.	50 gr.
60 to 70 Years	..	7 lb. dr.	45 gr.

N.B.—In the case of children under 12 years of age, the proportionate dose may be calculated by the formula $\frac{\text{age} + 12}{4}$. Thus, a child 4 years old requires $\frac{4 + 12}{4}$ i.e., $\frac{1}{2}$ of the dose for an adult.

INDIGENOUS DRUGS OF INDIA

By LIEUT.-COL. R. N. CHOPRA, M.A., M.D. (Cantab.), C.I.E., I.M.S.

(i) Drugs official in the pharmacopoeias.—Indian atropine, hyoscyamus and podophyllum from Kashmir were found to be of excellent quality and well up to pharmacopoeial standards. *Digitalis purpurea* grown in Kashmir had full therapeutic value. Tinctures of digitalis imported into India from Europe and America rapidly deteriorate in tropical climates and may lose from 25% to 45% of their efficiency within a few months. This has led subsequently to the manufacture by leading firms in Great Britain and America of special extra-strong digitalis preparations for the tropics, such as Burroughs Wellcome & Co.'s "Diginutin", and Parke, Davis & Co.'s "Digifortis". The leaf grown in Kashmir was as good as the best quality of imported leaf but the Nilgiri leaf was of inferior quality. *Digitalis lanata* grown in Kashmir has also been tested and found to be physiologically as active as that grown in Austria. Santonin from *Artemisia brevifolia* growing in Kashmir is quite as effective and very much cheaper than the costly Russian santonin. Excellent santonin can be prepared from both *Artemisia maritima* and *A. brevifolia*, growing in the northern Himalayas.

Psychotria ipecacuanha, growing in the Himalayas, gives a good yield of emetine which satisfies all the tests laid down in the U.S. Pharmacopoeia. Valerian, hyoscyamus, belladonna, colocynth, colchicum, and liquorice of Indian origin are all well up to pharmacopoeial standards. Many species allied to the official *Gentiana lutea* grow in India and are of excellent quality. The root and leaves of *Atropa belladonna* growing in the Himalayas yield a larger quantity of alkaloids than the standard laid down in the *British Pharmacopoeia*. Indian aconite and Indian ephedra are shown to have a high alkaloid content and grow abundantly in the Himalayas and could be utilized commercially. Indian aconite (ferox form) shows an alkaloidal content double that of the European *A. napellus*, whilst the Indian *A. chasmanthum* has ten times as much.

Indian *Colchicum luteum*, *Mentha arvensis*, *Juniperus communis*, *Ephedra vulgaris*, *Citrullus colocynthis*, *Berberis asiatica*, *Picrasma quassioides* and *Swerdia chirata* show a high standard of content of active principles and are suitable for therapeutic use. Many Indian manufacturers are now using preparations made from Indian-grown plants, instead of importing more expensive preparations from Europe or America. Indian squills from Chittagong proved to be much cheaper and just as efficacious as the imported Mediterranean variety. The alkaloid berberine was found to be widely distributed in the root and bark of nine Indian species of *Berberis* and allied genera, and the pharmacology and therapeutic uses of the drug were investigated. The drug has little or no action on bacteria, and it causes cardiovascular and respiratory depression when given intravenously. It is useless in the treatment of malaria, but has an almost specific action upon *Leishmania tropica*.

Indian musk has practically no therapeutic value as a heart tonic

and its reputation as a cardiac stimulant is not borne out on investigation. Indian thymol, menthol and camphor of good quality can be produced in large quantities at cheap rates. *Chenopodium ambrosioides* and *C. boiss* grow in Bengal, Assam and the Madras Presidency and in the temperate Himalayas. The Indian oil is therapeutically as effective as that from America.

(ii) Indian substitutes for official drugs.—Here the chief work done has been on Indian Ephedras. There are three species of Ephedra growing wild in India, and these give a high yield of total alkaloids, of which about half is ephedrine and half pseudo-ephedrine. The latter is an isomer of ephedrine and has an action closely similar to it. The price of imported ephedrine is very high, Rs. 800 per lb., and in 1928 the present writer commenced to use pseudo-ephedrine of Indian origin in asthma and as a cardiac stimulant. Its action is exactly similar to that of ephedrine, but a little weaker; the unpleasant side effects observed with ephedrine however, are less in evidence with pseudo-ephedrine. An alcoholic extract prepared from the plant has given excellent results in asthma and as a cardiac tonic. The maximal yield of alkaloids is obtained from plants collected in October.

Sida cordifolia, which is reputed to be one of the most valuable drugs in Ayurvedic medicine, and grows wild throughout India and Ceylon, contains a sympathetico-mimetic alkaloid having action closely corresponding to that of ephedrine. A similar alkaloid was also discovered in *Moringa pterygosperma*.

(iii) Drugs reputed to be of value in the Indian indigenous systems of medicine are:

Drugs found to be useless (despite their popular reputation):

Telakucha (*Cephalandra indica*) in diabetes.

Vitex peduncularis in malaria.

Berberine (from *Berberis aristata*) in malaria.

Harinine (from *Peganum harmala*) in malaria.

Vasicine (from *Adhatoda vasica*) in asthma.

Kalajira (*Nigella sativa*) in diabetes.

Kodo (*Paspalum scrobiculatum*), used as fodder for cattle, and sometimes as a food for man, may cause narcotic poisoning.

Asoka (*Saraca indica*) in menorrhagia and uterine hæmorrhage.

Silajatu (an exudate from certain rocks containing benzoates) in diabetes.

Abrak bhasman (calcined talc) in diabetes.

Banga bhasman (calcined tin) in diabetes.

Gymnema sylvestre in diabetes.

Arjun (*Terminalia arjuna*) as a supposed cardiac tonic.

Ulaikamal (*Abroma augusta*) in uterine disorders.

Gokkur (*Tribulus terrestris*) as a supposed diuretic.

Karkatsringee (*Pistacia integerrima*) as an antispasmodic.

Caesalpinia bonducella as an antiperiodic.

Hedaurin (from *Hedyotis auricularia*) in dysentery.

The seeds of *Butea frondosa* as a supposed anthelmintic.
Indian musk.

The useless remedies may be dismissed without further comment, but a few notes may be added with regard to those found to be of value.

Drugs found to be useful :

Punarnava is prepared from *Boerhavia diffusa*, and is of value in cases of oedema and ascites due to early disease of the liver, kidneys or peritoneum. The plant must be carefully collected, since it is often mixed with weeds, and some of the extracts on the market are quite useless. Also the right variety of plant—that with white flowers, and not the red-flowered variety—should alone be used. It causes a marked and persistent diuresis, but in ascites of kala-azar its use should be supplemented by antimony injections, and in other cases its action appears to be better if reinforced with mercury or iron.

Kut root (*Saussurea lappa*) contains an essential oil, an alkaloid, a higher sugar, and a resinous body. The essential oil has marked antiseptic and disinfectant properties, the alkaloid causes a small but well-maintained rise of blood-pressure, and a slight but definite bronchodilatation. The drug is of value in the treatment of cases of asthma of vagotonic origin, given in the form of an alcoholic extract of the root. The attacks are cut short and their frequency reduced. The underlying causes of the asthma however, require investigation in every case.

Babchi oil is obtained from the seeds of *Psoralea corylifolia*; these contain an essential oil and a resin. The oil has an effect on the arterioles of the sub-capillary plexuses of the skin, causing them to dilate, so that the plasma supply is increased in the area. The melanoblasts are stimulated and pigment production increased. When applied locally this oil is of some value in leucoderma, but it must be used cautiously as it is highly irritant.

Kurchi (*Holarrhena antidysenterica*) is effective in the treatment of chronic amoebiasis. *H. antidysenterica* grows abundantly in the sub-montane areas all over India. Its bark contains three alkaloids—conessine, kurchine and kurchicine. Conessine has a marked amoebicidal action, but the action of the total alkaloids is probably stronger.

These alkaloids are remarkably free from toxicity, and large doses can be given over long periods of time, e.g., one drachm of the liquid extract t.d.s. or 30 grains of the powdered bark t.d.s. for 10, 15 or 20 days. The hydrochloride of conessine or of the total alkaloids can be given hypodermically in one grain doses for ten days. *Kurchi* bismuth iodide, containing the total alkaloids, can be given in doses of 10 grains three times a day for 10 or 15 days. Treatment with *kurchi* is much pleasanter and more efficacious than treatment with emetine bismuth iodide. It has been shown that the bark must be collected at the right season of the year, and the

extraction carried out in the correct manner. Many of the inert or from extracts prepared with hot instead of with cold alcohol extraction. Patients on kurchi are not the miserable individuals who are trying to keep down emetine bismuth iodide. With a properly prepared extract results are better than with emetine bismuth iodide, some 70% of cases of chronic intestinal amoebiasis being apparently cured. In persistent cases 15-20 day courses of treatment can be given without any untoward effects. Kurchi is inferior to Carbarsone (Lilly); the latter, however, will probably soon become the drug of choice for the treatment of chronic amoebiasis. In cases which have proved resistant to both kurchi bismuth iodide and Carbarsone the writer advises 2-3 more courses of liquid extract of kurchi, 1-2 drachms twice daily, combined with *Plantago*

ovata (ispagula) seed. *Plantago ovata* (ispagula) has been a popular remedy in the indigenous systems of medicine in India for centuries. The seeds are used as a popular remedy in dysentery and intestinal fluxes, also to form cooling and demulcent drinks. The action appears to be purely mechanical, and due to the large amount of mucilage in the seeds. The seeds also contain a fatty oil, albuminous matter, and an inert glucoside. During the passage through the gut the drug coats the inflamed and ulcerated mucosa with a gel, which also adsorbs toxins and allays irritation. The seeds are also useful in cases of obstinate constipation, as they lubricate the gut and increase the volume of its contents.

Makaradhwaja is a very well known inorganic preparation in the Hindu materia medica. It contains small quantities of mercury in a state of fine suspension. Absorption of very small doses of mercury causes an increase in the number of red corpuscles and improves the body weight and general condition. Larger doses act in the reverse way. It seems possible that makaradhwaja may be of some value as a bacmantic and tonic.

An interesting inquiry was that on the value of *Rauwolfia serpentina*, an indigenous remedy much used in the treatment of insanity, epilepsy and high blood-pressure. On analysis, alkaloids were isolated which have a profound effect on the central nervous system, the cerebral centres being depressed in the reverse order to their development. The drug may prove a valuable sedative, but it has a depressant action on the respiratory centre; it lowers the blood-pressure and usually causes purgation. Other interesting studies were an investigation into a glucoside from *Thevetia nerifolia*, which has a digitalis-like effect, and on the crepsin ferment of the cucumber, which acts best in a slightly acid environment.

An interesting study is that of the country beers of India. It was found that they have a low alcoholic content and a high nutritive value, being rich in vitamins. In areas where these beers are drunk, there is a marked absence of vitamin deficiency diseases.

Snake venoms.—Snakes and their venoms have been regarded

of great medicinal value in India. The snake venom is called *Sarap visha* in Hindi and *Garala* in Sanskrit. The use of snake venoms in Hindu medicine is comparatively recent in origin. The Hindu practitioners obtain the poison by making the reptile bite a piece of wood; when the poison flows out it is collected on a plantain leaf.

The venom of *Indian cobra* (*N. naia vel tripudians*) produces death by respiratory failure which is initially stimulated before a complete paralysis. It has no action on the gastro-intestinal tract and does not produce any action on the accelerator mechanism of heart. There appears to be no justification for its uses as a cardiac stimulant.

The venom of *Indian daboia* (*Vipera russellii*) is slow in action and produces mainly localized effects. Death is due to a collapse produced by acute dilatation of the capillary circulation mainly of the splanchnic area and resembles that of histamine shock. The venom prolongs the coagulation time of blood. Drugs like adrenaline and Pituitrin, and perfusion of large doses of saline, may save the victim from impending death.

The venom of *Indian phoorsa* (*Echis carinata*) is also more or less similar to Indian daboia venom in action.

Cobra venom in doses of 0.1 milligram of the dried venom increasing up to 6 milligrams, has been used as an analgesic, instead of morphia, but its effect is erratic.

Russell's viper venom is used as a local haemostatic, and is one of the most powerful we have; it is particularly effective in stopping the bleeding in cases of haemophilia. Proprietary names are Rusven (Boots), and Stypven (Burroughs Wellcome). It is supplied in powder form and is mixed with distilled water containing 0.5% carholic acid immediately before use.

Fer-de-Lance venom (Lederle) is used in the same way.

All the above are particularly useful in stopping bleeding after tooth extraction.

INDIAN POISONS ACT (XII OF 1919)

(PASSED BY THE INDIAN LEGISLATIVE COUNCIL)

(Received the Assent of the Governor-General
on the 3rd September, 1919)

An Act to consolidate and amend the law regulating the importation, possession and sale of poisons throughout British India.

Whereas it is expedient to consolidate and amend the law regulating the importation, possession and sale of poisons throughout British India; it is hereby enacted as follows:

Short Title and Extent

1. (1) This Act may be called the Poisons Act, 1919.

(2) It extends to the whole of British India, including British Baluchistan and the Southern Parganas.

Presumption as to Specified Poisons

5. Any substance specified as a poison in a rule made or notification issued under this Act shall be deemed to be a poison for the purposes of this Act.

Penalty for Unlawful Importation, etc.

6. (1) Whoever—

- (a) commits a breach of any rule made under Section 2, or
- (b) imports into British India without a licence any poison the importation of which is for the time being restricted under Section 3, or
- (c) breaks any condition of a licence for the importation of any poison granted to him under Section 3,

shall be punishable:

- (i) on a first conviction, with imprisonment for a term which may extend to three months, or with fine which may extend to five hundred rupees, or with both, and
- (ii) on a second or subsequent conviction, with imprisonment for a term which may extend to six months, or with fine which may extend to one thousand rupees, or with both.

(2) Any poison in respect of which an offence has been committed under this section, together with the vessels, packages or coverings in which the same is found, shall be liable to confiscation.

Power to issue Search Warrants

7. (1) The District Magistrate, the Sub-divisional Magistrate and, in a Presidency-town, the Commissioner of Police, may issue a warrant for the search of any place in which he has reason to believe or to suspect that any poison is possessed or sold in contravention of this Act or any rule thereunder, or that any poison liable to confiscation under this Act is kept or concealed.

(2) The person to whom the warrant is directed may enter and search the place in accordance therewith, and the provisions of the Code of Criminal Procedure, 1898, relating to search warrants shall, as far as may be, be deemed to apply to the execution of the warrant.

Rules

8. (1) In addition to any other power to make rules hereinbefore conferred, the Governor-General in Council, or, subject to the control of the Governor-General in Council, the Local Government, may make rules generally to carry out the purposes and objects of this Act.

(2) Every power to make rules conferred by this Act shall be subject to the condition of the rules being made after previous publication.

(3) All rules made by the Governor-General in Council or by the Local Government under this Act shall be published in the *Gazette of India* or the local official Gazette, as the case may be, and on such publication shall have effect as if enacted in this Act.

Savings

9. (1) Nothing in this Act or in any licence granted or rule made thereunder shall extend to, or interfere with, anything done in good faith in the exercise of his profession as such by a medical or veterinary practitioner.

(2) Notwithstanding anything hereinbefore contained, the Local Government may in its discretion by general or special order declare that all or any of the provisions of this Act shall be deemed not to apply to any article or class of article of commerce specified in such order, or to any poison or class of poisons used for any purpose so specified.

(3) The authority on which any power to make rules under this Act is conferred may, by general or special order, either wholly or partially:

- (a) exempt from the operation of any such rules, or
- (b) exclude from the scope of the exemption provided by subsection (1),

any person or class of persons either generally or in respect of any poisons specified in the order.

Repeal of Act I of 1904

10. The Poisons Act, 1904, is hereby repealed.

ALTERNATIVE PREPARATIONS

Appendix XIX to the *British Pharmacopoeia*, 1914, gives the following alternative preparations sanctioned for use in tropical, subtropical and other parts of the British Empire.

AURANTII CORTEX.—In parts of the Empire where bitter oranges cannot be obtained, either dried bitter-orange peel or fresh sweet-orange peel may be used in preparing Tincture of Orange.

• **EMPLASTRA.**—In tropical and subtropical parts of the Empire, varying quantities of Hard Soap, Colophony, or Yellow Beeswax, may be employed in the preparation of the Plasters of the Pharmacopoeia, when prevailing high temperatures otherwise render the basis too soft for convenient use; but the official proportion of the active ingredient must in all cases be maintained.

EXTRACTA LIQUIDA.—In tropical and subtropical parts of the Empire any Liquid Extract, defined in the Pharmacopoeia, containing less than 30% v/v of ethyl alcohol, may have the proportion of ethyl alcohol increased to an amount not exceeding 30% v/v of the Extract, where otherwise the preparation would be liable to ferment.

LIMONIS CORTEX SICCATUS.—In tropical and subtropical parts of the Empire, when fresh Lemon Peel cannot be obtained, dried Lemon Peel may be used in preparing Concentrated Compound Infusion of Gentian, Fresh Compound Infusion of Gentian, Syrup of Lemon, and Tincture of Lemon.

OLEUM OLIVAE.—In parts of the Empire, other than the United Kingdom and the Irish Free State, where Olive Oil is not readily obtainable, Arachis Oil, or Sesame Oil, but no other oil or fat, may be employed in place of Olive Oil in making the official Liniments, Plasters, Ointments, and Soaps for which it is directed that Olive Oil be used.

UNGUENTA.—In tropical and subtropical parts of the Empire varying quantities of Benzoinated Lard, Lard, Suet, Yellow Beeswax, or White Beeswax, may be employed in the preparation of the Ointments of the Pharmacopoeia when prevailing high temperatures otherwise render the basis too soft for convenient use; but the official proportion of the active ingredient must in all cases be maintained.

PREPARATIONS THAT CAN BE PREPARED LOCALLY AT ANY DISPENSARY

1. **ACID. ACETIC. DIL.**
 B Acid. Acetic. Fort. 2 oz. 4 dr.
 Aqua. ad Oj
 Mix the acid gradually and shake well.
2. **ACID. HYDROCHLORIC. DIL.**
 B Acid. Hydrochloric. Fort. oz. 6
 Aqua. ad Oj
 Mix the acid gradually and shake well.
3. **ACID. NITRIC. DIL.**
 B Acid. Nitric. Fort. 3 oz. 7 dr.
 Aqua ad Oj
 Mix the acid gradually and shake well.
4. **ACID. NITRO-HYDROCHLORIC. DIL.**
 B Acid. Nitric. Fort. .. oz. 3
 Acid. Hydrochlor. Fort. oz. 4
 Aqua ad oz. 25
 Mix the acids gradually and keep the mixture in a glass-stoppered bottle for fourteen days before it is used.
5. **ACID. SULPHURIC. DIL.**
 B Acid. Sulphuric. Fort. 1 oz. 5 dr. ℥ 30
 Aqua. ad Oj
 Put half a pint of the water into a bottle, then introduce the sulphuric acid and gradually add the remaining distilled water.
6. **CITRIC ACID**
 If this is not in stock use Lime juice
 Note.—All strong acids after dilution should be kept for at least 24 hours before they are used except Acid. Nitro-Hydrochlor Dil., which should be kept for fourteen days.
7. **AQUA. CAMPHORAE**
 B Camphor. gr. 9
 Spt. Rectific. q.s.
 Aquae Oj
 Mix the camphor and spirit first and then add the water.
8. **AQUA. CHLOROFORMI**
 B Chloroform. ℥ 30
 Aquae oz. 25
 Mix and shake well until the chloroform is well dissolved.
9. **AQUA. MENTH. PIP.**
 B Ol. Menth. Pip. ℥ 7
 Spt. Rectific. q.s.
 Aquae Oj
 Mix the oil with the spirit, and then add the water. Shake until well mixed.
10. **AQUA. ANISI**
 B Ol. Anisi ℥ 7
 Spt. Rectific. q.s.
 Aquae Oj
 Mix the oil with the spirit first, and then add water. Shake until well mixed.
 Note.—In all oils if they do not mix well with water use a little alcohol in addition.
11. **GLYCERIN. ACID. BORIC.**
 B Pulv. Acid. Boric. ... dr. 2
 Glycerin. oz. 1
 (By measurement.)
 Heat the glycerine, add the acid bone to it, and rub well in a mortar.
12. **GLYCERIN. ACID. CARBOLIC.**
 B Acid. Carbolic. dr. 1
 Glycerin. oz. 1
 (By measurement.)
 Heat the glycerine, mix the acid carbolic with it, and rub well in a mortar.

13. GLYCERIN, ACID. TANNIC.

R Acid. Tannic. . . . dr. 1
Glycerin. . . . oz. 1
(By measurement.)

Heat the glycerin, mix the tannic acid with it, and rub well in a mortar.

14. GLYCERIN, ALUM.

R Pulv. Alum. . . . dr. 1
Aqueae dr. 1
Glycerin. ad oz. 1
(By measurement.)

Mix the water and alum, rub this down well in heated glycerine.

15. GLYCERIN, BORACIS

R Sod. Biorat. . . . dr. 1
Glycerin. . . . oz. 1

Heat the glycerin, mix the sodium baborate with it, and rub well in a mortar.

16. GLYCERIN, ICHTHYOL.

R Ichthylol. . . . dr. 1
Glycerin. . . . oz. 1
(By measurement.)

Heat the glycerin, mix the Ichthylol with it, and rub well in a mortar.

17. GLYCERIN, BELLADONNAE

R Ext. Belladonnae . . dr. 1
Aqueae dr. 1
Glycerin. ad oz. 1

Mix the water and Ext. Belladonnae, then rub with heated glycerin in a mortar.

Note.—In all the preparations of glycerin heat the glycerin before mixing it with other medicines, and if the preparation is not satisfactory heat it again, after it has been well rubbed together in the mortar.

18. INFUSUM AURANTII

R Bitter Orange Peel (dried, cut small) . . . dr. 2
Boiling water . . . oz. 10
Infuse in covered vessel for fifteen minutes. Strain for use. Dose: $\frac{1}{2}$ to 1 oz.

19. INFUSUM AURANTII COMPOSITUM

R Bitter Orange Peel (dried, cut small) . . . dr. 4
Lemon Peel (fresh, cut small) dr. 1
Cloves (bruised) . . gr. 27 $\frac{1}{2}$
Boiling water . . . oz. 10
Infuse in covered vessel for fifteen minutes; strain. Dose: $\frac{1}{2}$ to 1 oz.

20. INFUSUM BUCHU

R Buchu leaves, broken . . oz. 1
Boiling water Oz
Infuse in covered vessel for fifteen minutes; strain. Dose: $\frac{1}{2}$ to 2 oz.

21. INFUSUM CALUMBAE

R Calumba root (cut small) dr. 4
Cold water oz. 10
Infuse in covered vessel for fifteen minutes; strain. Use cold water. Dose: $\frac{1}{2}$ to 1 oz.

22. INFUSUM CARYOPHYLLI (CLOVES)

R Cloves (bruised) . . dr. 2
Boiling water . . . oz. 10
Infuse in covered vessel for fifteen minutes; strain. Dose: $\frac{1}{2}$ to 1 oz.

23. INFUSUM CHIRATAE

R Chirata (cut small) . . dr. 4
Boiling water . . . oz. 10
Infuse in covered vessel for fifteen minutes; strain. Dose: $\frac{1}{2}$ to 1 oz.

24. INFUSUM DIGITALIS

R Digitalis leaves (powdered) gr. 9
Boiling water oz. 1
Infuse in covered vessel for fifteen minutes; strain. Dose: 2 to 4 dr.

25. INFUSUM GENTIAN. CO.

R Gentian root (cut small) dr. 1
Bitter Orange Peel (dried, cut small) . . . dr. 1
Lemon Peel (fresh, cut small) dr. 2
Boiling water . . . oz. 10
Infuse in covered vessel for fifteen minutes; strain. Dose: $\frac{1}{2}$ to 1 oz.

26. INFUSUM QUASSIAE

R Quassia wood (rasped) . . gr. 5
Cold water oz. 1
Infuse in covered vessel for fifteen minutes; strain. Use cold water. Dose: $\frac{1}{2}$ to 1 oz.

27. INFUSUM SENEGAE

R Senega root (cut small) . . dr. 4
Boiling water . . . oz. 10
Infuse for half an hour in covered vessel; strain. Dose: $\frac{1}{2}$ to 1 oz.

28. INFUSUM SENNAE

R Senna oz. 1
Pulv. Zingib. . . . gr. 27 $\frac{1}{2}$
Boiling water . . . oz. 10
Infuse for fifteen minutes in covered vessel; strain. Dose: $\frac{1}{2}$ to 1 oz. or 2 oz.

29. INFUSUM UVAE URSI (BEARBERRY)
 R Bearberry leaves (bruised) .. dr. 4
 Boiling water oz. 10
 Infuse for fifteen minutes in covered vessel; strain. Dose: $\frac{1}{2}$ to 1 oz.
Note.—All infusions decompose after 24 hours; they must never be kept for use longer than this.
30. LINIMENT. CALCIS (CARBON OIL)
 R Solution of lime (lime water, Liq. Calcis) .. oz. 2
 Sweet Oil oz. 2
 Mix and shake well. Olive and linseed oils can also be used.
31. LINIMENT. CAMPHOR.
 R Camphor oz. 1
 Spt. Rectific. q.s.
 Sweet Oil oz. 4
 Mix well by rubbing in a mortar. Olive and linseed oils can also be used. Dissolve the camphor in alcohol, then add the oil.
32. LINIMENT. CHLOROFORM.
 R Lin. Camphor. oz. 2
 Chloroform. oz. 2
 Mix well.
33. LINIMENT. SINAPIS (MUSTARD LINIMENT)
 R Camphor dr. 2
 Spt. Rectific. oz. 4
 Castor Oil dr. 5
 Mustard Oil dr. 14
 Dissolve the camphor in alcohol, add the castor and mustard oils. Mix well.
34. LINIMENT. TURPENTINE
 R Soft Soap oz. 14
 Water oz. 5
 Camphor oz. 1
 Oil of Turpentine oz. 13
 Mix the soft soap with water 2 oz. Dissolve camphor in oil of turpentine, gradually add the latter solution to the former until the mixture becomes a thick creamy emulsion, lastly add sufficient water to make one pint.
35. LIQ. AMMONIAE ACETATIS
 R Ammon. Carb. oz. 1
 Acid. Acetic. 3 oz. 4 dr.
 Aqua. ad. Oj
 Take pestle and mortar, rub Ammon. Carb. to a fine powder, add 10 oz. of water, then gradually add Acid. Acetic, until a solution is formed; to this solution add water to make up to one pint.
36. LIQ. CALCIS (LIME WATER)
 R Lime dr. 1
 Aquae oz. 4
 Mix well, and keep shaking for 20 minutes.
37. LIQ. HYDRARG. PERCHLORID.
 R Hydrarg. Perchlor. .. gr. 10
 Common Salt gr. 10
 Aquae Oj
 Mix well; a clear solution is formed.
38. (a) LIQ. PLUMBI SUBACETATIS DEL. (Goulard's Lotion or Water).
 R Liq. Plumbi Sub. Fort. .. dr. 2
 Spt. Rectific. dr. 2
 Aqua. ad. Oj
 Mix the alcohol with water, to this add the strong solution of lead subacetate, and shake well.
- (b) LIQ. PLUMBI SUBACETATIS (Lead Lotion)
 R Lead Acetate gr. 30
 Spt. Rectific. dr. 2
 Aqua. ad. Oj
 Mix and shake well.
39. LIQ. POTASSAE
 R Pot. Hydrxid. (Caustic Potash) gr. 27
 Aquae oz. 1
 Mix with the water gradually.
40. LOTIO HYDRARG. NIGRA (Black Wash)
 R Calomel gr. 30
 Glycerin. dr. 4
 Mucilage oz. 14
 Liq. Calcis oz. 10
 Mix calomel with the glycerin and mucilage, add 2 oz. of the solution of lime to it, shake well, then add the remaining Liq. Calcis.
41. CHLORINE WATER
 R Pot. Chlorat. gr. 30
 Acid. Hydrochloric. Fort. .. 40
 Aquae oz. 12
 Take a dry, air-tight, stoppered bottle, put the potassium chlorate powder into it, and add Acid. Hydrochloric. Fort.; see that the gas does not escape from the bottle. Mix water gradually, corking every time.
42. CHLORINE MIXTURE
 R Quinine Sulphate gr. 2
 Aquae Chlorine oz. 1
 Mix for one dose.
 One dose to be given three times daily.

43. MUCILAG. ACACIÆ

R Gum Acacia (small pieces) oz. 4
 Aquae oz. 6
 Dissolve the gum in water and strain. To be kept in a closed vessel.

44. MUCILAG. TRAGACANTH.

R Pulv. Tragacanth. .. dr. 1
 Spt. Rectific. .. dr. 2
 Aquam ad .. oz. 10
 Mix the tragacanth with the alcohol, in a bottle, and shake, add water.

45. SPT. VIN. GALlici MIXTURE (Egg Flip)

R Brandy oz. 2
 Cinnamon Water .. oz. 2
 Sugar dr. 2
 Yolk of egg 1
 Rub the yolk of egg and sugar together, add cinnamon water and brandy. Dose: 1 to 2 oz.

46. PIL. QUININÆ SULPH.

R Quinin. Sulph. .. gr. 5
 Acid Citric or Lime juice q.s.
 Mix and make pill. Polish with honey or glycerin.

47. COUGH PILLS (country)

R Kakra Singi gr. 1
 Popala Mool gr. 1
 Gond Babool gr. 1
 Sendha Namak gr. 1
 Mix. One pill to be given three times daily.

48. COUGH PILLS

R Pil. Ipecac. cum Scillae
 (R P.) gr. 4
 Make into pills.
 One pill to be taken three times daily.

49. PIL. HYDRARG. (Blue Pill)

R Mercury gr. 16
 Conf. Rosae or Syrup. Simpl. gr. 24
 Liquorice Root (fine powder) gr. 8
 Rub the mercury with Conf. Rosae or syrup until globules of mercury are no longer visible, then mix in the liquorice powder. Divide into 12 pills. Dose: One pill two or three times daily, as necessary.

50. PIL. ASAFOETIDÆ (Hysteria Pill)

R Aloes gr. 12
 Asafoetida gr. 12
 Conf. Rosae or Syrup. Simpl. gr. 12
 Soap gr. 12
 Mix and divide into 12 pills. Dose: 2 or 3 pills daily, as necessary.

51. PIL. POT. PERMANGANAT.

R Pot. Permanganat. .. gr. ½
 Kaolin q.s.
 Vaseline q.s.
 Mix Pulv. Pot. Permanganat. with kaolin q.s., then add Vaseline q.s. and make into a pill.

52. CATHARTIC PILL

R Calomel gr. 3
 Ext. Hyoscyami gr. 2
 Ext. Colocynth. Co. .. gr. 5
 Mix and divide into two pills for one dose.

53. TONIC PILL

R Aloin. gr. ½
 Ferri Sulph. gr. 2
 Ext. Nuc. Vomic. .. gr. ½
 Ext. Gentian. q.s.
 Make one pill.

One pill to be given two or three times a day.

54. PULV. JALAPÆ CO.

R Pulv. Jalap. oz. 5
 Pot. Tart. Acid. oz. 9
 Ginger oz. 1
 Mix well. Dose: 20 to 60 gr.

55. PULV. RHÆI CO. (Gregory's Powder)

R Pulv. Rhubarb Root .. oz. 2
 Mag. Carb. Lewis oz. 6
 Pulv. Zingib. oz. 1
 Mix. Dose: 20 to 60 gr.

56. PULV. SOD. TART. EFFERVESCENS (Selditz Powder)

R Pulv. Sod Pot Tartrat. dr. 2
 Pulv. Sod. Bicarb. gr. 40
 Wrap in one paper.
 Acid Tartaric, dry, 38 gr. Wrap in another paper.

57. PULV. GLYCYRRHIZÆ CO.

R Pulv. Senna oz. 1
 Pulv. Liquorice oz. 1
 Pulv. Fennel Fruit oz. ½
 Sulphur oz. ½
 Sugar oz. 3

Mix. Dose: 1 to 2 dr.

58. PULV. CRETÆ AROMATICUS

R Cinnamon dr. 4
 Pulv. Nutmeg dr. 3
 Pulv. Cloves dr. 1½
 Pulv. Cardamom. dr. 1
 Sugar oz. 3 dr. 1
 Prepared Chalk oz. 1 dr. 3
 Mix. Dose: 10 to 60 gr.

59. SPT. CHLOROFORMI (Chloric Aether)

R Chloroform. oz. 1
 Spt. Rectific. ad Oj
 Mix. To be kept in a stoppered bottle.

60. SPT. CAMPHOR.
 B Camphor. . . . oz. 1
 Spt. Rectific. ad . . . oz. 10
 Mix. To be kept in a stoppered bottle.
61. SYRUP. AURANTII
 B Tr. Aurant . . . oz. 1
 Syrup. Simpl. ad . . . oz. 8
 Mix.
62. SYRUP SIMPLEX
 B Sugar . . . lb. 4
 Aquae . . . lb. 4
 Mix and boil down to 6 lb.
63. TR. IODINI
 B Iodine . . . dr. 4
 Pot. Iodid. . . . dr. 4
 Aquae . . . dr. 4
 Spt. Rectific. ad . . . Oj
 Place the iodine and potassium iodide in a bottle with the water, when this is dissolved add rectified spirit.
64. UNG. ACID. BORIC.
 B Pulv. Acid. Boric. . . oz. 1
 Vaseline . . . oz. 9
 Mix well.
65. UNG. ACID. CARBOLIC.
 B Acid. Carbol. . . oz. 3
 Glycerin. . . . oz. 14
 Vaseline . . . oz. 104
 Dissolve the phenol with the glycerin and add the Vaseline.
66. UNG. ACID. SALICYLIC.
 B Pulv. Acid. Salicylic. . . gr. 10
 Vaseline . . . oz. 1
 Mix.
67. UNG. BELLADONNAE
 B Ext. Belladonnae . . . dr. 1
 Spt Rectific. . . . dr. 1
 Vaseline . . . oz. 1
 Mix.
68. UNG. CHRYSAROBINUM
 B Chrysarobin (Goa Powder) . . . gr. 20
 Vaseline . . . oz. 1
 Mix these well; heat if necessary.
69. UNG. GALLAE CUM OPIO
 B Pulv. Gall. . . . dr. 2
 Opium . . . dr. 14
 Vaseline . . . oz. 1
 Mix well, if necessary, heat.
70. UNG. HAMAMELIS
 B Ext. Hamamelidis Liq. . . dr. 2
 Vaseline . . . oz. 2
 Mix well.
71. UNG. HYDRARG.
 B Mercury . . . oz. 1
 Vaseline . . . oz. 2
 Mix well until metallic globules cease to be visible.
72. UNG. HYDRARG. AMMONIATA
 (White Precipitate Ointment)
 B Hydrarg. Ammoniata . . oz. 1
 Vaseline . . . oz. 9
 Mix.
73. UNG. HYDRARG. CO. (Scott's Ointment)
 B Ung. Hydrarg. . . . oz. 10
 Wax . . . oz. 6
 Olive Oil or Sweet Oil . . oz. 6
 Camphor . . . oz. 3
 Mix Ung. Hydrarg., olive oil and wax by heating; add camphor in powder.
74. UNG. HYDRARG. IODIDI RUB. (Red Ointment)
 B Hydrarg. Iodid. Rub. . . gr. 20
 Vaseline . . . oz. 1
 Mix.
75. UNG. HYDRARG. SUBCHLOR.
 (Calomel Ointment)
 B Hydrarg. Subchlor. . . dr. 2
 Vaseline . . . oz. 24
 Mix.
76. UNG. IODI
 B Iodine . . . gr. 20
 Pot. Iodid. . . . gr. 20
 Glycerin. . . . dr. 1
 Vaseline . . . oz. 1
 Mix iodine, potassium iodide, and glycerin in mortar; add Vaseline gradually to it.
77. UNG. IODOFORMI
 B Pulv. Iodoform. . . . dr. 2
 Vaseline . . . oz. 2 dr. 2
 Mix.
78. UNG. SULPHURIS
 B Pulv. Sulphur. Sub. . . oz. 1
 Vaseline . . . oz. 9
 Mix.
79. UNG. ZINCI
 B Zinc. Oxid. . . . dr. 4
 Vaseline . . . oz. 1
 Add zinc oxide gradually to the Vaseline; mix well; if necessary, heat it.
80. UNG. HYDRARG. NIT. DIL. (Dilute Citrine Ointment)
 B Ung. Hydrarg. Nit. Fort. . oz. 1
 Vaseline . . . oz. 4
 Mix.
81. UNG. PICIS LIQUIDAE
 B Tar . . . oz. 5
 Wax . . . oz. 2
 Heat and mix well.
82. UNG. PLUMBI
 B Lead Acetate . . . gr. 20
 Vaseline . . . oz. 1
 Mix.

TABLE OF PERCENTAGES AND THE APPROXIMATE QUANTITIES OF MEDICAMENTS REQUIRED FOR MAKING LOTIONS, ETC

Percentage	Strength	in one drachm	in one ounce	in one pint	in one gallon
$\frac{1}{10}$ per cent.	1 in 10,000	gr. $\frac{1}{12}$	gr. $\frac{1}{4}$	gr. 1	gr. 7
"	1 in 6,000	gr. $\frac{1}{8}$	gr. $\frac{1}{3}$	gr. 1½	gr. 12
"	1 in 5,000	gr. $\frac{1}{6}$	gr. $\frac{1}{2}$	gr. 2	gr. 14
"	1 in 4,000	gr. $\frac{1}{5}$	gr. $\frac{1}{3}$	gr. 2½	gr. 18
"	1 in 3,000	gr. $\frac{1}{4}$	gr. $\frac{1}{2}$	gr. 3	gr. 23
"	1 in 2,000	gr. $\frac{1}{3}$	gr. $\frac{1}{2}$	gr. 5	gr. 35
"	1 in 1,000	gr. $\frac{1}{2}$	gr. 1	gr. 9	gr. 10
"	1 in 500	gr. $\frac{1}{2}$	gr. 1	gr. 18	gr. 20
"	1 in 100	gr. 1	gr. 4	gr. 27½	gr. 40
"	1 in 50	gr. 1½	gr. 8½	gr. 55	gr. 20
"	1 in 33	gr. 2	gr. 13	gr. 22½	gr. 20
"	1 in 25	gr. 2½	gr. 17½	gr. 50	gr. 20
"	1 in 20	gr. 3	gr. 22	gr. 17½	gr. 40
"	1 in 16	gr. 3½	gr. 26	gr. 45	gr. 20
"	1 in 14	gr. 4	gr. 30½	gr. 12½	gr. 40
"	1 in 12	gr. 4½	gr. 35	gr. 40	gr. 20
"	1 in 11	gr. 5	gr. 39	gr. 7½	gr. 20
"	1 in 10	gr. 5	gr. 44	gr. 35	gr. 40

INCOMPATIBILITY

Incompatibility is of three kinds:

- (a) **CHEMICAL INCOMPATIBILITY.**—Usually the result of interaction between two soluble salts, leading to the formation of another salt.
- (b) **PHYSICAL INCOMPATIBILITY.**—This occurs when the mixture of the substances will not form a clear solution.
- (c) **PHARMACOLOGICAL INCOMPATIBILITY.**—The combination of drugs having directly opposite actions, although this is sometimes deliberately done.

With the following drugs, it is particularly difficult to avoid chemical incompatibility:

Antipyrin.	Liquor Potassae.
Acid. Hydrocyanicum Dil.	Mineral Acids.
All Bromides.	Mercuric Chloride (especially).
Chlorine in solution.	Nitrites.
Guaiacum Tr.	Potassium Permanganate.
Gallic Acid.	Potassium Acetate.
Iodine in solution.	Quinine Sulphate.
All Iodides.	Silver Salts.
Iron, liquid preparations of.	Tannic Acid.
Lead Salts.	Zinc Salts.

The following combinations are or may become dangerous, and should in no circumstances be prescribed:

Arsenic and its Salts	..	with Mercuric Chloride, Magnesia, Lime water, astringent Tinctures.
Bromides or Iodides	..	with Calomel, Spirit of Nitrous Ether, Potassium Chlorate, stroog Acids.
Poisonous Alkaloidal Salts	..	with Alkalies, Alkaline Carbonates, Borax, Tannic Acid, astringent Tinctures, Iodides, Bromides, or Mercuric Chloride.
Chlorates	.. ..	Should never be rubbed together with any readily oxidisable substance, such as Sulphur, Creosote, Sugar, Iodine, Carbolic Acid, Salicylic Acid, Tannic Acid, etc.
Chromic Acid or Potassium Permanganate.		Should not be mixed with Glycerin or Alcohol.
Chloral Hydrate	.. ..	with Alkalies or Alkaline Carbonates.

The following drugs, frequently used in prescribing, are incompatible:

<i>Drug</i>	<i>Incompatible with</i>		
Mucilage Acacia	Alcohol, Borax, per-salts of Iron. Sulphuric Acid, Subacetate of Lead.
Acid. Arsenious.	Salts of Iron. Magnesia, Lime water. Tannin and other astringents.
Acid. Hydrochloricum	Lead and Silver salts, Alkalies and their carbonates.
Acid. Hydrocyanic. Dil.	Salts of Silver, Copper and Iron. Red Oxide of Mercury, and Sulphides.
Acid. Phosphoric.	Calcium preparations, Sodium Carbonate.
Acid. Sulphuric.	Alkalies and their carbonates, salts of Lead and Calcium.
Acid. Tannic.	Mineral acids, Alkalies, salts of Antimony, Lead, Silver, per-salts of Iron. Alkaloids, and Gelatin.
Liq. Ammon. Acetatis	Acids, Lime water, Caustic Potash, Caustic Soda, Alkaline carbonates, salts of Lead and Silver.
Alum	Alkalies and Alkaline Carbonates.
Ammon. Carbonas	Mercuric compounds. Solutions containing free Iodine, Bromine or Chlorine. Phenols, Chloral Hydrate.
Ammon. Chlorid.	Alkalies, Lead and Silver salts.
Bismuth Subnitras	Sod. Bicarb., Pot. Iodid., substances containing Tannin.
Calomel	Solutions of Alkalies and their carbonates. Iodides, Bromides, Cyanides. Nitro-Hydrochloric and Hydrocyanic Acids.
Cinchona preparations	Ammonia, metallic salts, and Gelatin.
Digitalis	Per-salts of Iron, Lead Acetate and Cinchona. Strong acids or alkalies.
Ergot	Tannic Acid and preparations containing it.
Ferri et Ammon. Citras	Mineral acids, vegetable astringents and fixed alkalies.
Ferri et Quininae Citras	Alkalies and their carbonates. Tannic Acid, vegetable astringents.

The following drugs, frequently used in prescribing, are incompatible:

<i>Drug</i>	<i>Incompatible with</i>	
Tr. Ferri Perchlor.	All vegetable astringent solutions, except infusions of Quassia and Calomba. Alkalies and their carbonates, Lime water. Carbonates of Calcium and Magnesium. Mucilage.	
Hydrarg. Perchlor.	Most substances. Alkalies and their carbonates. Pot. Iodid., Lime water, Tartar Emetic, Silver Nitrate, Lead Acetate, Albumin, Soaps and Tannic Acid.	
Ipecacuanha	Mercury, Lead salts, Vegetable acids, and Astringent infusions.	
Lead Acetate	Acids, Albumin, Alkalies, Carbonates, Chlorides, Chromates, Citrates, Iodides, Phosphates, Soap, Tannin, Sulphates, Tartrates.	
Magnesia	Acids.	
Mag. Sulphas	Alkaline carbonates, Lime water, Lead Acetate, Silver Nitrate.	
Opium	Has the incompatibilities of its constituents. The alkalies, and their carbonates. Lime water, salts of Lead, Iron, Mercury, Zinc. Liq. Arsenicalis and vegetable Astringents.	
Pot. Bromid.	Acids, Acid salts, Metallic salts and Strychnine.	
Pot. Iodid.	Bismuth Subnitrate, Liquorice, preparations containing Starch. Sweet Spirit of Nitre, Calomel, soluble salts of Mercury, Silver and Lead.	
Quinn. Sulphas	Alkalies and their carbonates, Astringent infusions.	
Salicylates (alkaline)	Acids, Ferrie Salts and Spirit of Nitrous Ether.	
Spiritus Aetheris Nitrosi	Pot. Iodid., Tr. Gaiacum, Gallic and Tannic acids, Antipyrine, Ferri Sulph., Emulsions.	
Zinc Valerianate	Acids, soluble carbonates, Tannin and metallic salts.	

TABLE OF SOLUBILITIES

				In Water at 60° F.	In Alcohol 90 per cent.
Acetanilide	..	..	..	1 in 200	1 in 1
Acid Arsenious	..	..	..	1 in 100	1 in 140
" Benzoic	..	..	..	1 in 400	1 in 2½
" Boric	..	..	..	1 in 30	1 in 18
" Cacodylic	..	..	..	2 in 1	1 in 3½
" Carbofic	..	..	..	1 in 12	readily
" Citric	..	..	..	10 in 6	10 in 15
" Oxalic	..	..	..	1 in 8	1 in 6
" Tartaric	..	..	..	10 in 8	1 in 8
" Gallic	..	..	..	1 in 100	1 in 5
" Salicylic	..	..	..	1 in 500	1 in 3
" Tannic	..	..	..	1 in 1	5 in 3
Aloin	..	..	..	1 in 120	1 in 18
Alumen	..	..	..	1 in 10	insoluble
Ammon. Carb	..	..	..	1 in 4	slightly
" Benzoat.	..	..	..	1 in 6	1 in 30
" Bromide	..	..	..	1 in 1½	1 in 13
" Chloride	..	..	..	1 in 3	1 in 60
" Iodide	..	..	..	1 in 1	1 in 9
" Phosph.	..	..	..	1 in 4	insoluble
Antipyrine	..	..	..	1 in 1	readily
Antim. Tart.	..	..	..	1 in 17	slightly
Aspirin	..	..	..	1 in 400	1 in 5
Atropine	..	..	..	1 in 300	1 in 8
Butyl Chloral Hydrate	..	..	..	1 in 50	1 in 1
Chloralamide	..	..	..	1 in 10	readily
Caffeine	..	..	..	1 in 80	readily
Caffeine Citras	..	..	..	1 in 32	1 in 22
Campbor	..	..	..	1 in 700	readily
Chaulmoogra Oil	..	..	..	..	readily
Chloroform	..	..	..	1 in 100	readily
Codeine	..	..	..	1 in 80	readily
Ether (0.720)	..	..	..	1 in 9	readily
Eucaine Hydrochlor.	..	..	..	1 in 22	1 in 14
Ferri Tart.	..	..	..	1 in 4	sparingly
" Sulph.	..	..	..	1 in 2	insoluble
Heroin. Hydrochlor.	..	..	..	1 in 2	1 in 11
Hydrarg. Perchlor.	..	..	..	1 in 16	1 in 3
Lithia Benzoate	..	..	..	1 in 3	1 in 13
" Citrate	..	..	..	1 in 2½	—
" Carb.	..	..	..	1 in 70	insoluble
" Salicylate	..	..	..	readily	readily
Mag. Sulph.	..	..	..	1 in 1	—
Morph. Hydrochlor.	..	..	..	1 in 24	1 in 50
" Acet.	..	..	..	1 in 6	1 in 100
" Sulph.	..	..	..	1 in 15	1 in 460
" Tartras	..	..	..	1 in 11	insoluble
Phenacetin	..	..	..	slightly	1 in 20
Phenalgin	..	..	..	1 in 110	insoluble
Pilocarpine Nit.	..	..	..	1 in 9	slightly
Plumbi Acet.	..	..	..	1 in 3	1 in 30
Potass. Bicarb.	..	..	..	1 in 3	insoluble
" Bichromate	..	..	..	1 in 10	—
" Bromide	..	..	..	1 in 2	1 in 90
" Chlorate	..	..	..	1 in 16	—
" Citrate	..	..	..	10 in 6	insoluble
" Iodide	..	..	..	4 in 3	1 in 16
" Nitras	..	..	..	1 in 4	—
" Permang.	..	..	..	1 in 20	decomposed

TABLE OF SOLUBILITIES—continued

					In Water at 60° F.	In Alcohol 90 per cent.
Protargol	..	..	..	..	1 in 2	—
Quinine	Bihydrochlor.	..	..	..	1 in 0.75	1 in 5
"	Bisulph.	..	..	..	1 in 8	1 in 18
"	Hydrobrom.	..	..	..	1 in 40	1 in 0.7
"	Hydrochlor.	..	..	..	1 in 35	1 in 3
"	Sulphate	..	..	..	1 in 900	1 in 86
Saccharin	..	..	..	..	1 in 400	1 in 30
Sacc. Lact	..	..	..	..	1 in 7	insoluble
Salicin	..	..	..	..	1 in 28	1 in 60
Sodu Arsenate	..	..	..	..	1 in 6	slightly
"	Benzoas	..	..	..	1 in 2	1 in 25
"	Bicarb.	..	..	..	1 in 11	—
"	Bibor.	..	..	..	1 in 22	—
"	Cacodyl	..	..	..	1 in 2	1 in 1
"	Hypophosph.	..	..	..	1 in 1	1 in 30
"	Phosph.	..	..	..	1 in 6	—
"	Salicyl.	..	..	..	1 in 1	1 in 6
"	Sulph.	..	..	..	1 in 3	—
"	Sulphocarb.	..	..	..	1 in 6	1 in 150
"	Tart.	..	..	..	1 in 2	insoluble
Strychnine	Hydrochlor.	..	..	..	1 in 35	1 in 60
"	Nitras	..	..	..	1 in 42	1 in 120
"	Sulph.	..	..	..	1 in 31	1 in 65
Sulphonol	..	..	..	..	1 in 450	1 in 50
Tetronal	..	..	..	..	1 in 550	1 in 12
Thallium Sulph.	..	..	..	..	1 in 7	1 in 100
Trional	..	..	..	..	1 in 320	1 in 11
Urotropine	..	..	..	..	5 in 6	1 in 8
Veronal	..	..	..	..	1 in 160	1 in 8½
Zinc Acet.	..	..	..	..	1 in 2	1 in 40
"	Sulph	..	..	..	10 in 7	insoluble
"	Sulphocarb.	..	..	..	1 in 2	1 in 2½

NEUTRALIZATION TABLE

					Citric Acid	Tartaric Acid
Amm. Carbonate	..	..	20 gr. neutralizes	27	gr.	28½ gr.
Magnes. Carbonate	..	..	20 gr.	28½	gr.	31½ gr.
Pot. Bicarbonate	..	..	20 gr.	14	gr.	15 gr.
Pot. Carbonate	..	..	20 gr.	17	gr.	18 gr.
Sod. Bicarbonate	..	..	20 gr.	16½	gr.	18½ gr.
Sod. Carbonate	..	..	20 gr.	10	gr.	10½ gr.

TABLE OF MELTING POINTS

						Deg. Fahr.
Acid Benzoin	..	..	..	..	..	250.5
" Carbolie	..	..	..	..	..	102
" Salicylic	..	..	..	..	..	314.6
" Stearic	..	..	..	..	..	156.6
Adeps	..	..	..	..	..	100.4
Camphora	..	..	..	..	..	347
Cera Alba	..	..	..	..	..	149
Cera Flava	..	..	..	..	..	145-147
Cetaceum	..	..	..	..	..	122
Chloral Hydras	..	..	..	..	..	136
Japan Wax	..	..	..	..	..	122

TABLE OF MELTING POINTS—*continued*

						Deg. Fahr.
Lanolinum	..	..	..	..	..	104
Menthol	..	..	..	..	..	109.4
Naphthalin	..	..	..	..	..	176
Oleum Theobrom.	..	..	..	..	..	86-91
Paraffin Dura	..	..	..	..	..	130-135
Paraffin Moll.	..	..	..	..	..	95-102
Resorcin	..	..	..	..	..	230-246
Salol	..	..	..	..	..	107-109
Sevum Praep.	..	..	..	..	..	112-120
Stearin	..	..	..	..	..	127-129
Sulphur	..	..	..	..	..	239
Thymol	..	..	..	..	..	122
Ung. Cetacei	..	..	..	..	..	96.8
Ung. Resinae	..	..	..	..	..	129.2

ALCOHOL DILUTION TABLE

FOR THE DILUTION OF ALCOHOL 90% TO
WEAKER OFFICIAL B.P. STRENGTHS

To make:

(1) Alcohol 70%, 1 pint (Sp. Gr. 0.8900, 22.7° O.P.)—

B Distilled Water	..	..	..	℥iv	℥ 398
Alcohol 90%	..	..	..	℥xv	℥ 266;

(2) Alcohol 60%, 1 pint (Sp. Gr. 0.9135, 5.20° O.P.)—

B Distilled Water	..	..	..	℥vii	℥ 74
Alcohol 90%	..	..	..	℥xiii	℥ 160;

(3) Alcohol 45%, 1 pint (Sp. Gr. 0.9436, 21.2° U.P.)—

B Distilled Water	..	..	..	℥x	℥ 256
Alcohol 90%	..	..	..	℥xi;	

(4) Alcohol 20%, 1 pint (Sp. Gr. 0.9760, 64.9° U.P.)—

B Distilled Water	..	..	..	℥xv	℥ 390
Alcohol 90%	..	..	..	℥iv	℥ 213.

To mix an alcohol of 10% strength (by volume), commencing with 90% (volume) alcohol, take 10 parts, by volume, of 90% alcohol, and make up to 90 parts by volume, with water, when cooled to 15.5° C. (60° F.).

Example.—To make 68% alcohol, take 68 fluid ounces of 90% alcohol, add about 20 ounces of water, cool the mixture to 15.5° C. (60° F.) and make up, with water, to 90 fluid ounces.

DYSENTERY

ACUTE DYSENTERY.—In brief, there are two kinds of dysentery: amoebic and bacillary; the former is treated with emetine and the latter with sulphonamides.

As it is important to distinguish between the two, the main points of difference are given in the following Table. Mixed forms occur, probably about 15%, but figures vary.

	<i>Amoebic</i>	<i>Bacillary</i>
Incubation period	Three weeks or more. (Only 10% of persons harbouring amoebae have symptoms of dysentery (Acton))	2-6 days
Onset	Gradual (tries to work)	Sudden (goes to bed)
Number of stools in 24 hours	Rarely more than 12	3-50 or more (may be "glued to the lavatory")
Situation of pain and tenderness	Epigastrium and right side of abdomen	Epigastrium and left side of abdomen
Tenesmus	Rare	Invariable. ("As though someone had pushed a red-hot poker up my backside")
Fever	Rare except with hepatitis	Usual. May be as high as 103° F.
Nature of stool	Small, dark, liquid, offensive, contains blood-streaked mucus, acid	At first, diarrhoea. Then "red currant jelly", sticks to the bed pan. Later purulent. Finally pasty (=convalescence). Usually odourless and alkaline. Occasionally choleraic
Microscopical appearance of stool	Few pus cells. Many red cells, often in clumps. Some amoebae, containing red cells, Charcot-Leyden crystals	Many pus cells. Some red cells (= "Bacillary exudate")
Treatment	<p>(a) As a start give an ounce of castor oil with 15 minims Tinct. Opū</p> <p>(b) Give emetine, one grain intramuscularly every day for 8 days. Stop for 4 days and give four more injections</p> <p>(c) Keep the patient in bed throughout the course of emetine, because it affects the myocardium</p> <p>(d) After the emetine course give Carbarsone or Leucarsone (M & B), one tablet twice a day for 10 days</p> <p>(e) Every few days examine the stools, especially any mucus, for entamoebae or cysts</p> <p>(f) Give Pétrolagar, Isphagula or Isogel to prevent constipation</p>	<p>(a) Give sulphaguanidine, one tablet for every 10 lb. of weight as the initial dose, followed by half this dose every 4 hours (the usual adult dose is 12 tablets—6 grammes—to begin with, followed by 6 tablets 4-hourly); or give sulphathiazole or sulphapyridine in one-third of the above dosage</p> <p>(b) Give plenty of fluids; at least 6 pints a day to an adult</p> <p>(c) If there is dehydration, give Rogers's hypertonic saline (see Cholera). In children, dehydration must be combated; subcutaneous saline is given if intravenous is impossible</p> <p>(d) If sulpha drugs are unobtainable, give Sod. Sulph., 2 drachms in 2 ounces of water, 2-hourly; in severe cases give serum</p>

Severe colic can be relieved by full doses of Tinct. Hyoscyami with some belladonna, opium and kaolin, e.g.,

B. Kaolin.	..	..	..	..	3ij
Tinct. Hyoscyami	..	..	..	..	3j
Tinct. Belladonnae	..	..	..	..	℥ 5
Tinct. Opii	..	..	..	..	℥ 5
Aq. Menth. Pip ad	..	..	..	..	3j

Tenesmus.—A bland rectal washout with Sod. Bicarb. 2 drachms to the pint has a soothing effect.

Bacteriophage.—The writer has never seen any benefit from this, but it has its advocates. Large doses are said to be more effective than those usually advised, but it is not worth while suspending other treatment in order to try bacteriophage.

Diet.—During the acute stage give nothing but glucose-lime juice water; later, add soup, milk, rice water, Marmite, jellies and fruit, minced apple having a high reputation in bacillary dysentery; later still, allow eggs, custard, halwa, junkets, rice, chicken, fish and vegetables.

Dysentery in children is a serious disease carrying off many thousands yearly. Dehydration must be combated by fluids and toxæmia by specific remedies.

CHRONIC AMOEBIIC DYSENTERY.—This may be very hard to cure. It is important to distinguish it from sprue. The typical history is one of repeated mild attacks of diarrhoea; there is a chronic pain or sense of discomfort in the left side of the abdomen, usually worse after meals, which often induces a desire to defæcate; in any case, there are generally frequent small stools, with or without mucus. There may be a good deal of flatulence and the patient's pants or shirt often show faecal stains; he gets tired easily, feels depressed, lacks initiative and may have a slight evening temperature; he looks unhealthy, probably has lost weight and may be anaemic; when he has been ill for some time he is apt to bore his friends and his doctor with plaintive descriptions of the latest misdemeanours of his bowels and of how the motions looked that morning.

Stool examination.—The motion is usually soft, of a yellowish or greyish colour and may show mucus or blood. The microscope sometimes shows an amoeba or two or a few cysts, Charcot-Leyden crystals may be seen, and blood and pus cells are generally present (unlike sprue).

Sigmoidoscopy should be done in every case and reveals small, easily bleeding ulcers, sometimes of a diamond shape.

TREATMENT.—As the bowel is suffering from a mixed infection, treatment with sulphaguanidine forms a good beginning so as to help in cleaning up sepsis. Give eight tablets as the first dose and four, four times a day for five days thereafter.

The patient must drink plenty of fluids.

If the patient has not recently had a course of emetine, a grain a day may be given for eight days, as soon as the sulphaguanidine course is over, or emetine bismuth iodide powder, gr. 2-3 may be given nightly in a capsule. The emetine course may be followed by one of Carbarsone or Lencarsone one tablet twice a day for 10

days. Napier recommends a daily bowel wash of 2% Sod. Bicarb. in warm water, which the patient returns, followed by a retention enema of 1:1,000 silver nitrate of 6-8 ounces, the strength being gradually increased up to 1:250 and the treatment being given for at least four weeks.

In severe cases or very intractable cases, Hargreaves has had great success with penicillin followed by emetine.

The initial dose of penicillin is 100,000 units, followed by 3-hourly doses of 33,000 units, until 2,000,000 units have been given. Two $7\frac{1}{2}$ grain tablets of Sulphasuxidine or other sulphonamide are given four times a day.

The above treatment takes a week and it is probable that the penicillin dosage could be considerably reduced.

Emetine bismuth iodide gr. 3 in gelatine capsule, *not* compressed into a tablet or in a keratine-coated pill, is now given every night for 10 nights, or emetine gr. 1, daily may be given intramuscularly. The patient must remain in bed. The course may be repeated if necessary.

Diet.—This is important, the essential being that it should be easily absorbed, adequately nourishing, containing the necessary vitamins and leaving only a small residue. Milk, eggs, Horlick's milk, Benger's food, chocolate, soups, steamed or creamed fish or chicken, glucose, and Marmite are all useful. For the first two days of treatment diet should be fluid, solids being added gradually. These patients sometimes fail to absorb vitamins by the mouth, so it may be a good thing to give them by injection at first.

CHRONIC BACILLARY DYSENTERY.—This is less common than it was before the advent of the sulphonamides and is usually due to the Flexner bacillus. Sulphaguanidine is the treatment and may be helped by colonic lavage. (*See also* Colitis.)

DYSMENORRHOEA

DYSPAREUNIA

}—See Gynaecology.

DYSPEPSIA

In connexion with this frequent disorder it is important to remember that, with many patients who complain of indigestion, the organ at fault is not the stomach, and secondly that there are many varieties of dyspepsia. Speaking generally the three chief symptoms are (1) Vomiting; (2) Pain; and (3) Flatulence. It must be borne in mind that vomiting may be due to such conditions as uraemia, pregnancy, phthisis or cerebral disease; that pain is a symptom of gall-stones, pleurisy or chronic appendicitis, etc.; and flatulence among other causes may be due to gall-stones or cardiac disease.

Finally when we have decided that the cause of the trouble is located in the stomach, we must decide as to whether it is functional

or organic; if there is marked interference with the general health, if the pain is so severe as to make the patient stop work and rest, and the vomiting is persistent, the balance of evidence is strongly in favour of organic disease, and conversely in favour of a functional condition.

The general line of treatment should be directed to (1) discovering the cause and correcting it; (2) the selection of a diet, including alcohol, suitable to the impaired function of the stomach; (3) general hygienic measures such as regular exercise in the open air, careful attention to the teeth, meals taken at regular times and well masticated; smoking should be prohibited at first, and regular action of the bowels advised; (4) prescribing such drugs as are known to correct the particular function impaired.

CHRONIC DYSPEPSIA.—Hurst lays stress on the following points:

Successful treatment depends upon accurate diagnosis, the average duration of symptoms in his private patients with gastric and duodenal ulcer when they first came under his care was ten years, and with carcinoma of the stomach twelve months. It is thus obvious that there is room for improvement in the diagnosis of chronic indigestion. There are three stages in the diagnosis; with sufficient care it is possible to make an accurate diagnosis in about 75% of cases from consideration of the history, and this is most important. The patient should give a full description of everything he does, and everything he eats and drinks, in an average day, and to describe in detail the nature, position, time of onset, exciting causes and manner of obtaining relief of every unpleasant sensation he experiences.

The second stage in investigating a case of indigestion is the physical examination, without which it is quite unjustifiable to make a diagnosis. Abdominal examination may show some localized muscular rigidity or an area of tenderness, which suggests organic disease of the stomach, duodenum, gall-bladder, appendix or colon.

The third stage of investigation is by means of special methods, radiological and biochemical, there is little to choose between them. The discovery of occult blood in the stools is as valuable a sign as the X-ray picture; it is present in all cases of carcinoma of the stomach and in a large majority of cases of chronic gastric and duodenal ulcer. The fractional test-meal is often very useful, and is the only means of recognizing achlorhydria, whether due to chronic gastritis or achylia gastrica, and it may be a great help in diagnosing carcinoma of the stomach, and in deciding upon the correct treatment in cases of ulcer. It is remarkable to find how often patients with achlorhydria have been treated for years for supposed hyperchlorhydria.

Indigestion is often caused by disease of other organs, whereas the frequency of appendix dyspepsia has been much exaggerated; gall-bladder dyspepsia Hurst believes is the most common cause of chronic indigestion.

Sthenic Dyspepsia (Excess of HCl)

R Bismuth. Subnitrat ..	gr. 25	R Liq. Bismuthi et Amm.	..	5i
Cera Oxalat ..	gr. 10	Cit. ..	..	5ij
One cachet t.d.s., after food.		Syrup. Pruni Virg. ..	..	5ij
		Aquam ad ..	..	3j
			t.d.s.	
R Liq. Bismuthi ..	..	5ss	R Pepsin. ..	gr. 2
Acid. Hydrocyanic. Dil. ..	℥ 2		Liq. Bismuthi ..	℥ 15
Liq. Morph. Acet. ..	℥ 15		Tr. Nuc. Vom. ..	℥ 5
Spt. Amm. Aromat. ..	℥ 15		Tr. Card. Co. ..	℥ 30
Vin. Pepsini ..	5j		Spt. Chloroform. ..	℥ 10
Inf. Auranti Co ad ..	3j		Inf. Gent. Co. ..	5ss
	t.d.s.		Aquam ad ..	3j
				t.d.s.

Asthenic Dyspepsia (Deficiency of HCl)

R Acid. Hydrochlor. Dil. ..	℥ 25	R Pepsin. ..	gr. 2
Liq. Strychninae ..	℥ 5	Acid. Nitro-Hydrochlor.	..
Glycerin Pepsin. ..	5j	Dil. ..	℥ 5
Aqua. Menth. Pip. ad ..	5ss	Tr. Nuc. Vom. ..	℥ 5
With water, t.d.s., immediately		Inf. Calumba ad ..	5j
after food.			

The following drugs may also
be added to this Mixture:

Liq. Fern Perchlor.
Liq. Morph. Hydrochlor.
Liq. Arsenic. Hyd.
Quinin. Hydrochlor.

Dyspepsia of the Aged

R Ferri Peptonati ..	gr. 3
Pancreatin ..	gr. 1
Strychnine ..	gr. 1/2

Painful Dyspepsia

R Pulv. Capsici ..	gr. 1/2
Pul. Saponis Co. ..	gr. 3
Ol. Anthemidis ..	gr. 1/2
One pill after each meat meal.	

Nervous Dyspepsia

R Ferri Bromidi ..	gr. 1
Quinin. Hydrobrom. ..	gr. 1
Ext. Rhei ..	gr. 1/2
One pill twice a day.	

R Aq. Laurocerasi ..	5j
----------------------	----

Flatulent Dyspepsia

R Tr. Cardamom. Co. ..	℥ 20
Tr. Zingibers ..	℥ 15
Spt. Amm. Aromat. ..	℥ 10
Spt. Chloroform. ..	℥ 10
Acid. Hydrocyanic. Dil. ..	℥ 3
Aqua Carui ad ..	5ss

R Chloroformi ..	5j
Tr. Anisi ..	5j
Tr. Nuc. Vom. ..	5j
Tr. Gentian. ..	5j
Ten to 20 drops in water 20	
minutes before a meal.	

*Flatulence and Painful Gastric**Spasm*

R Spt. Amm. Aromat. ..	℥ 15
Spt. Aetheris Co. ..	℥ 8
Liq. Morph. Hydrochlor. ..	℥ 4
Aqua Menth. Pip. ad ..	5ss

*Flatulent Dyspepsia with Dilated**Stomach*

R Hydrarg. Perchlor. ..	gr. 1/2
Strychninae Sulph. ..	gr. 1/2
Creosoti ..	℥ 1 or 2
One pill before, between, or after	
meals.	

*Acid Eructations, Discomfort, and**Flatulent Distension*

R Tr. Rhei ..	5j
Sod. Bicarb. ..	gr. 15
Mag. Carb. ..	gr. 10
Spt. Amm. Aromat. ..	5ss
Aqua Carui ad ..	5ss
Taken occasionally.	

R Sod. Bicarb. ..	gr. 15
Spt. Amm. Aromat. ..	℥ 20
Spt. Armoraciae Co. ..	℥ 20
Inf. Calumb. ad ..	5j
	t.d.s.

R Menthol ..	gr. 1
Calomel ..	gr. 1/2
Pulv. Ginger ..	gr. 2
Maltine ..	q.s.
One pill to be taken every quarter	
of an hour, until relieved.	

Intestinal Flatulence

R Oleum Cajuput.	..	..	..	..	℥ 2
Ext. Gentian.	..	..	..	..	q s.

One pill.

R Terebene, 10 to 15 ℥ on a lump of sugar, or in capsule, t.d.s.

DYSPEPSIA IN CHILDREN (*See also Coeliac Disease.*)

ACUTE.—Stop all food; if the vomiting continues after some hours, wash out the stomach. Then give Calomel, $\frac{1}{4}$ – $\frac{1}{2}$ gr. every three hours, until eight or ten doses have been given; then Bismuth in large doses.

CHRONIC.—This condition occurs in children, generally between the ages of five and eight. The following treatment is recommended by Hutchison. Careful attention to the diet, the limitation of carbohydrates, and almost complete exclusion of sugar. Change of air and a regular aperient.

R Pulv. Rhei	..	..	..	..	gr. 8
Sod. Bicarb.	..	..	..	..	gr. 10
Hydrarg. cum Creta	..	..	..	..	gr. 1 to 2

Every night, or, in milder cases, every second night.

With:

R Pot. Bicarb.	..	..	..	..	gr. 5
Pot. Cit.	..	..	..	..	gr. 5
Tr. Nuc. Vom.	..	..	..	..	℥ 1
Inf. Gentian. Co. ad	℥ ij

In a little water a quarter of an hour before meals.

EAR, DISEASES OF

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EXAMINATION.—Examine the auricle and the pre-auricular gland, enlargement or tenderness of which suggests inflammation in the meatus; this is confirmed if pulling gently on the auricle causes pain.

The auriscope.—Brunton's auriscope is best used with a flashlight held to the trumpet-shaped opening, or it can be manipulated so that the sun shines through it. Always use the smallest-sized speculum. An electric speculum is better because it can be moved more easily.

Draw the auricle backwards with the finger and thumb of one hand and hold the auriscope in the other. If the meatus is narrow, tell the patient to open his mouth, this draws the condyle of the

jaw forward. Carefully examine the skin of the meatus, look for wax and examine the drum if visible. Always examine both ears.

REMOVAL OF WAX.—Put the patient in a good light, tilt his head to the opposite side and pour in a few drops of fresh hydrogen peroxide; let it fizz for 5 minutes (if it does not fizz it is bad, and something else must be used). Fill the ear syringe with warm water or boric lotion, put a towel on the patient's shoulder and let him hold a kidney tray against the cheek an inch or two below the ear.

Hold the syringe vertical, and expel all air. Draw the patient's ear gently backwards with the left hand, insert the nozzle of the syringe just inside the meatus and pointing slightly upwards so that the fluid will run along the roof.

Press the plunger, at first gently, but increasing the force as the end of the stroke is reached.

Repeat until all the wax appears to have come out, then examine again with the auriscope and persevere with syringing until the meatus is seen to be clear of wax. Repetition of the peroxide often loosens obstinate pieces of wax.

If the wax cannot be removed, put in some drops of warm olive oil or glycerin, or a mixture of the two, plug with cotton-wool, and syringe again after 24 hours.

FOREIGN BODIES IN THE EAR.—Insects sometimes get into the external auditory meatus or children push in beads, seeds, pieces of wood and the like. More harm can be caused by clumsy attempts at removal than by the presence of the foreign body, as is shown by the fact that many a foreign body has remained in place for weeks. Ultimately, it is liable to cause inflammation.

Treatment—Examine the foreign body with an auriscope to confirm presence, shape and size, noting any space between it and the skin of the meatus. If the foreign body is a piece of wood, or some such thing, with a projecting end which can be gripped with a pair of forceps, these may be used. Otherwise, never use forceps for removing a foreign body; they only push it in.

Generally, insects have to be drowned with warm oil or chloroformed, after which they can be syringed out, gently scooped out with a small blunt spoon or vectis, or drawn out with aural forceps. The only permissible instrument for removing other foreign bodies such as beads, seeds, etc., is an aural book, which has a small hook at the end, 3 mm. long, is made of steel and is very fine: if one is not available, an eye "vectis" or an iris hook does fairly well.

Pass the book on the flat, between the foreign body and the meatus, then turn it through a right angle, which brings the hook behind the foreign body, when judicious traction will remove it.

If a body such as a bead, is tightly jammed, first put some adrenaline in the meatus, leave it for 10 minutes, and then put in some glycerin, after which removal may be easier. Never attempt to remove a foreign body while the meatus is inflamed, or while it is lacerated or swollen from previous attempts. Wait until things have

settled down. Children generally require an anaesthetic, otherwise a sudden jerk may cause disaster. After removing a foreign body, always inspect with an *auriscope*. The ultimate resort is to pull the ear forwards, make an incision behind it, incise the cutaneous and cartilaginous meatus and gouge away as much of the posterior wall of the bony meatus as may be necessary to enable an instrument to be passed deep to the foreign body.

OTITIS EXTERNA.—This is very common in the tropics, especially where the air is damp and much bathing is indulged in. It may be due to furunculosis of the skin of the meatus, to infection from a discharging ear or to a fungus infection, of which the commonest is *aspergillus*. Furunculosis may be confused with acute mastoiditis, which often causes swelling of the posterior wall of the meatus. In furunculosis, however, there is no swelling or tenderness over the mastoid.

Prevention.—The causes producing the infection must always be avoided and the ears kept dry. Anyone bathing in an endemic area should plug his ears with cotton-wool impregnated with a sulphathiazole ointment, or Ung. Hydrarg. Ammoniata and Vaseline.

Furunculosis.—Dry the meatus with spirit and insufflate with sulphathiazole—1% flavine powder. Pain may be relieved by aspirin or other sedatives. Sulphathiazole may be given orally and in severe cases penicillin may be required. In chronic cases an autogenous vaccine should be given, and chemotherapy used in very acute cases.

Aspergillosis and other fungus infections.—The "membrane" is of a dirty greyish colour and is generally described as resembling wet newspaper. It can be syringed out, generally leaving a raw surface. Microscopical examination will show the fungus. The best treatment is instillation of 1% flavine or 2% thymol in spirit twice daily. Oddly enough, one of the *Penicillium* group of fungi occasionally infects the ear.

OTITIS MEDIA, ACUTE.—The advent of the newer sulphonamides changed this disease from a surgical emergency to a medical miracle, which has been enhanced still further by penicillin.

It is commonest in adenoid children, but can occur at any age and is usually preceded by a nasal infection; it is not, comparatively speaking, common in India, thanks to the absence of a cold, damp climate. Owing to its former sinister reputation, it is often diagnosed when not present.

When a child who has, or has lately had, a cold, holds its hand to its ear and cries, or complains of pain in the ears always suspect acute otitis media. The characteristic symptom is a throbbing pain, worse at night, and the characteristic sign a bulging, red, ear-drum.

Treatment.—As already indicated, this is by sulphonamides and, if need be, penicillin, but if the bulging of the tympanic membrane is acute and it seems likely to burst it should be incised, the site of election being behind the handle of the malleus, and the incision being made from below upwards. A special knife called a

myringotome should be used and the operation performed under direct vision through an electrically illuminated speculum. Owing to force of circumstances the writer has performed it blindly with a very narrow cataract knife, but the method is not recommended. If the drum is to be incised or seems likely to burst the external auditory meatus must be sterilized, as the great danger in these cases is secondary infection. A few drops of 1% flavine in spirit should be poured into the meatus, which is then lightly plugged with sterile cotton-wool.

Treatment of recently perforated drum.—Never syringe, as this may carry infection into the middle ear.

Swab the meatus gently with a sterile swab on a stick, insufflate with sulphathiazole-1% flavine powder and lightly plug with sterile cotton-wool, which is changed once a day when it gets soaked with pus or muco-pus, and give chemotherapy. Under this treatment recent perforations heal in a week or two and the ear becomes normal.

ACUTE MASTOIDITIS—Extension to the mastoid is shown by the classical signs of inflammation, namely, pain, redness, swelling and tenderness appearing over the mastoid process, tenderness on percussion or pressure being the earliest of these. A rise in temperature and in the leucocyte count may be also present.

Treatment.—This is to incise the drum if discharge is not already free, and to push chemotherapy. If there is fluctuation over the mastoid the abscess is incised. The modern trend is to rely on the treatment described above and to remove any dead bone later by means of the simple mastoid operation or to let it form a loose sequestrum, which it does in about 8 weeks. The external auditory meatus is kept as antiseptic as possible.

LATERAL SINUS THROMBOSIS.—This is indicated by a rigor or by severe sweating and is an urgent call for penicillin and sulphonamides, the first few doses of the latter being given intravenously. The organism is usually the *Streptococcus haemolyticus* (75%) and sometimes the pneumococcus or staphylococcus. The best surgical treatment is opening of the mastoid and ligation of the internal jugular vein.

CHRONIC OTITIS MEDIA WITH PERFORATED DRUM.—This follows neglect of the proper treatment for perforation advised in the last paragraph. The mastoid cells also are often infected.

Chemotherapy and local treatment are usually followed by considerable improvement. It is essential to attend to the nose, to remove adenoids and to treat chronic catarrh by means of inhalations and vaccines.

Indications for operation.—

Cerebral symptoms

Attacks of vertigo, indicating spread of inflammation to the inner ear

Repeated exacerbations of symptoms

Granulations, indicating chronic osteitis

Cholesteatoma (usually has a bad smell)

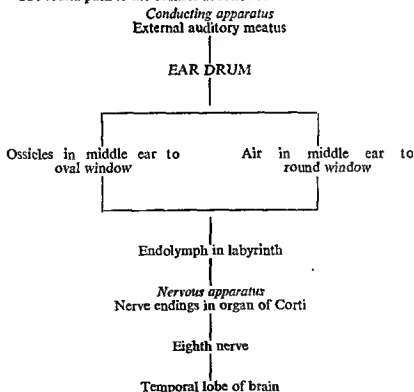
Chronic suppuration which is not amenable to other treatment.

The radical mastoid is the operation usually done in such cases. The general opinion is that the compact type of mastoid is both more liable to chronic suppuration and more difficult to cure than the cellular type, so X-ray examination may help in deciding the best line of treatment.

DEAFNESS.—It used to be said that "There are two kinds of deafness; the kind you can cure and the kind you can't cure: the kind you can cure is due to wax". The operation of fenestration for otosclerosis is, however, giving very promising results, and hearing aids improve every year. The essential point about a hearing aid is that it should be brought into use early, otherwise the patient is apt to discard it. The fenestration operation is one for the expert.

Apart from wax, the common causes of deafness are old age, heredity, otosclerosis, and chronic otitis media, often the result of neglected or imperfectly removed adenoids in childhood. Even in adult life a severe cold or an attack of influenza is liable to be followed by otitis media. The deafness of old age appears to be caused by degeneration of the cochlea.

The sound path to the brain is as follows:



Deafness is therefore divided into that due to some defect in the conducting apparatus and that due to some defect in the nervous apparatus (auditory nerve). The former is the commoner.

Let the reader hum a tune and suddenly stop his ears; if, as we hope, his hearing is normal, the tune at once sounds louder because he has temporarily put his conducting apparatus out of action. This is the basis of the tests for distinguishing between conducting deafness and nerve deafness, of which Weber's and Rinne's are the best known.

Weber's test.—Place a tuning fork on the vertex of the patient's skull; if the deafness is unilateral the sound is louder in the affected ear in conducting deafness and quieter in nerve deafness.

Rinne's test.—Knock a tuning fork on the table and listen to it until you can hear it no longer; then put the base of the tuning fork on your mastoid process; you still cannot hear it if your ear is normal or if you have nerve deafness. Stop your ear with a finger and repeat the experiment; you hear it on the mastoid process after you have ceased to hear it with the stopped ear. The same applies to patients with conducting deafness.

OTOSCLEROSIS is a slowly progressive osteitis which immobilizes the stapes and seems to affect both the mechanics and the nerve endings in the labyrinth. It is often hereditary and it is interesting to note that when several cases occur in a family, the latter are all of the same blood group; it usually begins before the age of 50.

Treatment.—The operation of fenestration where a new round window is made, and kept open by a plug of cartilage gives the best results. Otherwise, hearing aids may be used.

MIDDLE-EAR DEAFNESS, the result of chronic inflammation or catarrh, is very common. Sometimes there is chronic catarrh of the Eustachian tube, a condition peculiarly troublesome to those who fly, because rapid equalization of pressure on both sides of the drum is impossible.

Treatment—Attention to the nose, especially to adenoids and the turbinates is carefully given. The condition can often be improved by inflating the middle ear, which can be done in three ways.

- (a) The patient holds the end of his nose and tries to blow it; if the Eustachian tubes are patent, he hears a "pop" in the ears
- (b) A Politzer's bag is connected with a rubber tube which has an olive-shaped piece of vulcanite at the end. Put the "olive" in one nostril, close the other, tell the patient to open his mouth, and squeeze the bag sharply. Air should pass into the middle ear.
- (c) *Eustachian catheter.* This is passed as follows:
 - (i) spray the nose three times with 10% cocaine solution containing a little adrenaline;
 - (ii) connect your ear with the patient's by means of a rubber tube;

- (iii) take the catheter and pass it, beak downwards along the floor of the nose until it reaches the posterior pharyngeal wall;
- (iv) turn it through 90 degrees so that the beak is in the middle line;
- (v) withdraw it until the beak meets the septum;
- (vi) turn it through 180 degrees; the beak is now in contact with the opening of the Eustachian tube;
- (vii) apply Politzer's bag to the catheter and blow;
- (viii) if the catheter is in the right place and the tube is permeable to air, you will hear the patient's eardrum click, and the patient will feel it "pop".

SENILE DEAFNESS.—This is part of the general degeneration which affects ageing tissues and is increased by arteriosclerosis. According to one theory the nerves in the organ of Corti degenerate and according to another there is calcification of the membrane in the labyrinth which vibrates under the influence of sound. The ability to hear high-pitched notes is the first to disappear. As the deafness is of the nerve type, bone conduction is less than air conduction and in contrast to the soft tones of the middle-ear or otosclerotic type, the patient is apt to talk in a loud aggressive voice to the frequent consternation of his younger relatives.

Treatment.—Vitamin B has been given in large doses but with little benefit; arteriosclerosis should be attended to and a good hearing aid prescribed.

MÉNIÈRE'S DISEASE.—The combination of severe tinnitus followed by extreme vertigo ("I thought the tent-pole was going to hit me" a patient on a camp bed in Burma once said to the writer) is so characteristic that it cannot be mistaken. Vomiting and collapse may follow, and a spontaneous remission occurs after minutes or hours. The disease is accompanied by progressive nerve deafness and attacks come at varying intervals with complete freedom in between them.

(Distinguish thrombosis of the posterior inferior cerebellar artery, "cerebellar apoplexy"; no sudden remission and usually followed by facial hemianaesthesia.)

The cause appears to be an acute rise in the pressure of the endolymph contained in the labyrinth and the semicircular canals of one ear; a sort of glaucoma of the inner ear. The patient is usually middle-aged.

Treatment has two objects; to reduce the pressure of the endolymph and to reduce the patient's sensitivity to the unpleasant stimuli.

The first is carried out by various means:

- (a) Reduce the salt and the fluid in the patient's diet and encourage diuresis by means of ammonium chloride with or without a mercurial diuretic.

- (b) Give nicotinic acid to dilate the peripheral vessels and increase absorption.
- (c) Sheldon and Horton advise the giving of histamine in order to increase capillary absorption; they give 2.75 milligrams of histamine diphosphate in 250 c.c. of 0.8% potassium chloride solution intravenously, the injection taking one hour and being repeated daily for three or four days. At the same time they give one-hundredth of a milligram of histamine subcutaneously, increasing up to one-tenth of a milligram. A maintenance dose of subcutaneous histamine is also advised.

Sensitivity to the stimuli is best reduced by Luminal (Gardenal, phenobarbital); the usual dose is $\frac{1}{2}$ –1½ grains night and morning.

If the case resists all the above measures, the labyrinth may be destroyed by alcohol injection or the vestibular portion of the eighth nerve cut.

The disease has been known to occur because of a hæmorrhage in myelogenic leukaemia, and theoretically the same thing might happen in scurvy.

NERVE DEAFNESS occasionally occurs with mumps, when it is unilateral and incurable; the symptoms may resemble those of Ménière's disease. Other rare miscellaneous causes of deafness are influenza, measles, scarlet fever, typhus, enteric, syphilis, meningitis,

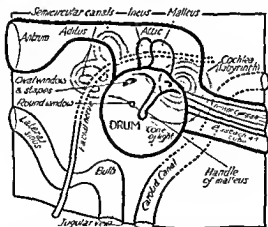


Fig. 6.—The main structures of the right ear as seen from outside.

smallpox, eighth nerve tumour, quinine, the salicylates, alcohol, tobacco, lead, mercury and arsenic. The last two are of interest because if a syphilitic becomes deaf before treatment it may be due to the disease, but if deafness occurs during treatment it is more likely to be due to the remedy.

ECLAMPSIA

ECTOPIC GESTATION

} —See Gynaecology.

ECTROPION—See Eye.

ECZEMA

Some 25 years ago an effort was made to delete the word eczema from the medical vocabulary, dermatitis, due to various causes, being substituted. Unfortunately for this praiseworthy effort we do not know the cause in all cases, so eczema remains as meaning an inflammatory exudative skin lesion due to an unknown, but probably allergic cause. Many varieties of eczema have been described, but they all at some stage exhibit the characteristic "weeping".

Treatment—general.—If possible find the cause, which may be similar to and as elusive as that of an attack of asthma. Otherwise treatment is devoted to avoiding contact with certain well-known causes such as alcohol internally, irritants and adverse climatic conditions externally, keeping the bowels regular but not purged, eliminating septic foci and secondary infection, and allowing a good generous healthy diet (special dieting is, as a rule, useless, the patient often knows what food, if any, is likely to be followed by eczema). Unsuspected amoebiasis is a not uncommon cause of eczema in India, so a course of emetine is often worth a trial.

Another line of treatment sometimes found successful is desensitization of the patient by ephedrine, injections of adrenaline in oil, calcium gluconate, peptone or the patient's own blood. As in all other diseases, vitamins and sulphoamides are now popular, and both have been given with benefit; vitamins A, B and C, especially A, should always be given a trial and the sulphonamides, either by mouth or locally, are useful where there is secondary infection, but several cases of "eczema" have been reported as due to the local application of sulphonamides. Penicillin so far has not been reported as curing eczema itself, but it cures any superadded infection. Benadryl is always worth trying.

Local treatment can almost be summarized in the one word "zinc", which in an ointment, a paste, a cream or a lotion forms the basis of most applications. Lotions and creams are useful for the acute stage, and pastes and ointments for the chronic, when a stimulant such as Ichthyol, coal tar or pine tar may be added. The following are useful examples:

LOTIONS (for acute stage)

Calamine lotion

R Calaminae Praep.	}	aa gr. 30
(=impure Zinc. Carb)		
Zinc. Oxid.		
Glycerin,		℥ 30
Aq. Rosae ad		℥ j

Zinc and Lead lotion

R Zinc. Oxid.	℥ j
Liquor. Plumbi Subacet.	
Fort.	℥ 10
Glycerini	℥ 10
Aq. Calcei	℥ j
Aq. Rosae ad	℥ j

Protargol or Argyrol 1% is also useful for the "weeping" stage.

Zinc Cream

B Zinc. Oxid.	}	..	..	aa
Adep. Lanae				3j
Ol. Oliv.				aa
Aq. Calcis				3ij
				Ichthyol, 3j.
				Camphor, gr. 10, etc., may be added to either.

Calamine Cream

B Calaminae Praep.	}	..	..	aa
Zinc. Oxid.				gr. 30
Ol. Oliv.				aa
Aq. Calcis				3ss

Menthol, gr. 10,
Camphor, gr. 10, etc., may be added to either.

Lassar's Paste

(without salicylic acid)

B Zinc. Oxid.	}	..	..	aa
Pulv. Amyli				3j
Paraff. Moll. ad				3j

Unna's Paste

B Zinc. Oxid.	}	..	..	aa
Glycerin.				3iss
Gelatin.				3j
Aq. ad				3j
				Ichthyol, dr. 1-2, may be added.

Siccolam (British Drug Houses) is one of the best applications for the exudative stage.

OINTMENTS

Zinc Ointment and Ung. Zinc. Olcat. (B.P.) are useful and an old favourite for resistant cases is:

Unguentum Metallorum

B Zinc. Oxid.	}	..	..	aa
Ung. Hydrarg. Nit. Fort.				gr. 20
Plumbi Acetatis				aa
Hydrarg. Subchlor.				gr. 10
Paraff. Moll. ad	..	..	..	3j

or another ointment containing tar, may be used:

B Zinc. Oxid.	..	..	..	3j
Liquor. Carb. Deterg.	..	..	..	℥ 30
Paraff. Moll. ad	..	..	..	3j

ECZEMA IN CHILDREN.—In children, eczema generally begins on the head or face, and for some reason is commonest in a first child. Treatment is on the same lines as for adults, but great care must be taken to prevent the child from scratching. Crusts are removed by starch and boric-acid poultices made as follows. Take a teaspoonful of boric acid and a tablespoonful of starch; mix to a paste with cold water and add a pint of boiling water. Spread the paste on gauze or muslin and apply with the gauze or muslin side to the skin. Sedatives may be needed to keep the child quiet.

ELECTRICAL TREATMENT

By E. P. CUMBERBATCH, M.B., F.R.C.P.

In treating disease or injury electricity acts in one of three ways: (1) by heating the tissues; (2) by producing chemical changes in them; and (3) by stimulating muscle and nerve. Certain advantages are gained if electricity is chosen for producing these effects. They are as follows: (1) Electricity can raise the temperature of parts which are too deeply situated to be reached by heat applied externally. An electric current is passed through the tissues. It produces heat by overcoming their resistance. The heat is generated

in the superficial and deep tissues alike. In other words, diathermy is produced. The current is known as a diathermic current. (2) Electricity can produce chemical caustics within the tissues. The quantity formed is under the control of the operator. The destruction of abnormal tissue by this method is a form of treatment known as electro-chemical cauterization. The galvanic current is used for the purpose. The same current is used for treatment by a process which cannot be copied by other agents. Thus, when solutions of therapeutic chemicals (drugs) are placed in contact with the skin or mucous membrane, the galvanic current can make them penetrate to a depth which cannot be reached by the simple process of diffusion. This constitutes a form of treatment known as medical ionization. (3) The use of electricity for stimulating muscle and nerve enables us to bring about one effect, at least, which cannot be achieved by other artificial agent. Voluntary muscle can be made to contract; it can be made to give a twitch, or a series of twitches, or a prolonged contraction, both when voluntary power is preserved and when it is lost. Faradic and sinusoidal currents are generally used for procuring contraction when reactions of the muscle are of the normal type. If, in addition, the use of electricity has an encouraging effect on the patient's mind, it should not, therefore, be deprecated, and the therapeutic nihilist will be furnished with a reason for attributing some value to it.

Diathermy is now employed to raise the temperature of the whole body to 105° F. and to procure the so-called "therapeutic fever"; in general paralysis of the insane it yields as high a proportion of successful results as the artificial production of malaria and, moreover, is safer. Mention might also be made of the use of a current (belonging to the same family as the diathermic current) in the treatment known originally as fulguration, or better as electro-desiccation. In this form of treatment abnormal tissue is killed by directing sparks on it. Those who have not heard of it may be inclined to laugh. It is true that other methods, such as burning and chemical cauterization, will destroy tissue. The sparks dry or desiccate the tissues, and the subsequent reaction is much less, and the cosmetic results far better than those of the actual cautery or chemicals; the scars are soft, smooth and over contract. In a patient with a vascular fibrous growth of a vocal cord treated by electro-desiccation voice was fully regained and the scar left was almost imperceptible.

Various examples can be given to show how the employment of electricity (in the form of the galvanic current) for introducing germicidal or cauterizing ions can achieve success in diseases in which the simple application of solutions or solids to the surface usually fails. The value of the electrical method (ionization) can be seen in the treatment of cervicitis; although a much greater experience has been obtained with diathermy in this disease, ionization is much more effective than the treatment commonly employed, viz., the packing of the cervical canal with germicidal preparations, and will succeed when the last-mentioned method fails. If a zinc

rod is placed in the canal and connected to the positive pole of a galvanic battery there will be a migration of zinc ions into the mucous membrane. They will kill bacteria in their path. They will unite with the tissue proteins and form zinc aluminat which provides a sterile protective lining and remains in position for ten to fifteen days. During this time reinfection from without cannot take place. If, on the other hand, the zinc rod is connected to the negative pole of the battery there will be a migration into the cervix of hydroxyl ions which have germicidal properties and in addition act indirectly on the glands of the cervix and increase their secretion for a day or more after the ionization, thus securing most efficient drainage. When the discharge is inspissated it is advisable to begin the treatment with the zinc rod attached to the negative pole, and when free drainage is established the rod should be connected to the positive pole so that the protective lining of zinc aluminat may form.

The following examples illustrate the value of the galvanic current as a cauterizing agent. A fine needle electrode can be placed in the follicle of an unwanted hair. The passage of the current leads to the formation of caustics around the needle. The caustics destroy the follicle, and the hair, with its pigmented bulb can be lifted out. If the needle is insulated, except at its free end, the canterization can be restricted with precision to the base of the follicle, the skin being undamaged. By inserting the tip of a zinc needle into the central vessel of a stellate vein or the base of a pedunculated wart and passing the current, the whole of the stellate vein or the entire wart will disappear, leaving no mark. As already stated, the value of the galvanic current, as a cauterizing agent is that it produces the caustics in the situation needed and in the amount desired. Other advantages are the slight reaction after the treatment and the excellence of the cosmetic results.

Among the morbid conditions in which electricity is useful on account of its power of stimulating the excitable tissues, the most obvious are those in which some muscular weakness and wasting persist after the responsible factors have ceased to act; thus, when inflammation in a joint, due to injury or disease, has subsided, the muscles controlling the movement of the joint can be helped to regain their power if they are artificially exercised by the faradic or sinusoidal current. This help is required when the patient cannot use the muscles or cannot use them adequately; thus, when extension of the knee is weak and limited, the vastus internus may be more wasted and weak than the rest of the quadriceps. This part of the muscle can be given a greater share of artificial exercise, and an increase in its size can be seen to take place. When muscles are weakened or paralysed in consequence of disease or injury of their motor nerves, recovery can be accelerated if they are artificially exercised by electrical methods, provided, of course, the injury or disease has been adequately treated. Further, most patients are encouraged when they see their paralysed muscles contract.

Electrical contraction of muscle can usefully be practised when

movement is painful in consequence of adhesions left between muscle and fibrous tissue in cases of past fibrositis; the contraction should take the form of separate twitches, thirty or so per minute; the twitches are painful at first, but the pain soon diminishes and disappears while the initial treatment is being administered. The range of painless movement can gradually be increased by this method. A preliminary application of heat, especially diathermy, hastens the results, if it is made before the twitches are produced. An induction coil provided with a slowly acting interrupter may be used, but the twitches can be more effectively obtained by means of the static machine when large masses of muscle, such as the gluteal and lumbar, are involved.

The value of the sinusoidal current, administered in full-length baths, in poliomyelitis, after the acute stage has subsided, is known to few. It was introduced by the late Lewis Jones, who practised the treatment for many years at St. Bartholomew's Hospital. The current does not cause contraction of muscles showing the reaction of degeneration, and when administered by the bath method its strength is not raised to a value sufficiently high to make the normal muscles contract. This reason and the fact that the method of action of the current is not precisely understood are responsible for the present neglect of the sinusoidal current in the treatment of poliomyelitis.

ELEPHANTIASIS—See Filariasis.

EMISSIONS, NOCTURNAL

These are physiological and should be treated only if they are caused by a posterior urethritis or phimosis. Constipation, if present, should be treated, the patient reassured and his attention diverted from his sexual organs by exercise in the open air. The habit may sometimes be broken by giving Sod. Bromid. gr. 30 with Tr. Opii ℥ 7 just before bedtime for 4 or 5 nights.

EMPHYSEMA OF THE LUNGS

Treatment in the first place should be preventive by stopping the recurrent acute attacks in a case of chronic bronchitis. Climate is an important factor; it should be warm and moist, free from wind and more especially from dust. The condition, while it may be arrested, cannot be cured, but is considerably benefited in many cases by potassium iodide which may be given in one of the following prescriptions:

R Pot. Iodid.	..	..	gr. 5	R Pot. Iodid.	..	..	gr. 2
Pot. Bicarb.	..	..	gr. 15	Lq. Arsenicalis	..	..	℥ 2
Amm. Carb.	..	..	gr. 3	Tr. Nuc. Vom.	..	..	℥ 2
Aqua. Camph. ad	℥j	Inf. Gentian. Co. ad	℥j

t d s.p c.

t.d.s p.c.

The potassium iodide is gradually increased.

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Aqua. Camph. ad	3j	Inf. Gentian Co. ad	3j
t.d.s p.c.				t.d.s.p.c.			
				The potassium iodide is gradually increased.			

EMPHYSEMA, SURGICAL

This resulting from laceration of the pleura and lung, while causing discomfort is not in itself a serious complication although it may spread as far as the wrist and ankles, causing a fine crackling under the skin.

EMPHYEMA

There are three varieties, common, uncommon and rare. Dullness to percussion arouses suspicion, but a good X-ray picture and the aspiration of pus make the diagnosis certain.

COMMON.—

Pneumococcal empyema is the commonest of all. It follows an attack of pneumonia or pleurisy, often after an apyrexial interval. The walls of the cavity are thick and so is the pus. The missed empyema sometimes explains hectic fever in a child.

Treatment.—This is by chemotherapy, including aspiration, washing out and leaving penicillin (5,000 units per c.c.) solution inside. If this fails or is impossible, drain as follows.

- (a) Aspirate pus at point of maximal dullness, leaving needle *in situ*.
- (b) Inject a local anaesthetic under the skin and down to the rib for two inches on each side of the needle (four inches altogether).
- (c) Cut down on to the rib and through the periosteum, detach the periosteum from its deep and superficial aspects and resect two inches of rib.
- (d) Incise the deep periosteum and pleura allowing pus to escape, but apply a swab during inspiration to prevent rapid sucking in of air.
- (e) Insert a wide drainage tube with holes at the side and a safety pin through the outer end.
- (f) Apply ample dressings.

After-treatment.—Continue chemotherapy, shorten the tube as required, encourage the patient to blow through bottles, inflate balloons or to blow a (silent for the sake of the other patients) trumpet. The cavity may be washed out with eusol if the pus is very thick. Closed drainage, with the end of the tube in a bottle on the floor, is often helpful in closing the cavity.

Streptococcal Empyema.—This occurs during an attack of influenzal streptococcal pneumonia. The pus is thin and so are the walls of the empyema, so open drainage must not on any account be tried.

Treatment.—This is by chemotherapy, aspiration of the pus and replacement by penicillin solution 5,000 units per c.c., repeated daily if necessary; this produces brilliant results. If penicillin is not available, give sulphonamides and aspirate the pus.

UNCOMMON.—Empyema due to injury or wound (common in war). Treatment is by chemotherapy, general and local, excision of damaged tissues and drainage.

Tuberculous empyema sometimes complicates pneumothorax, artificial and spontaneous, or a secondary infection may be superimposed on a pleuritic effusion, which is almost always tuberculous in origin. Treatment is mainly to prevent or cure secondary infection. Burrell describes a cold benign, and a malignant pyothorax type. The former should be treated by repeated aspiration so as to allow the lung to expand; the latter may complicate a spontaneous pneumothorax or artificial pneumothorax with a torn adhesion and is a very serious condition; the treatment is aspiration, irrigation and chemotherapy. When things have quietened down thoracoplasty may be helpful in tuberculous cases. Amoebic empyema occurs when a liver abscess bursts through the diaphragm, treatment being by aspiration and by giving emetine. Sometimes rupture into a bronchus occurs, when the patient coughs up "anchovy-paste" pus and spontaneous cure may follow, but emetine and chemotherapy must be given.

RARE.—Malignant disease, actinomycosis and very occasionally ruptured infected hydratid cyst, which may be in the upper lobe.

ENCEPHALITIS LETHARGICA

There is no known treatment which affects the active phase of the disease. Post-encephalitic Parkinsonism can be considerably improved by scopolamine (hyoscine) with stramonium, e.g.,

B Hyoscin Hydrobrom.	..	..	..	gr. $\frac{1}{16}$
Extr. Stramonii Sicc.	..	..	..	gr. 1
Excipient.	..	..	..	q.s.
Ft. pil. Sig. one or more as directed by the physician.				

The dose may have to be increased considerably, but a suitable maintenance dose is one pill two or three times a day.

ENDOCARDITIS, INFECTIVE

This is uncommon in India, and is usually due to the *Streptococcus viridans*, which becomes engrafted on an already damaged heart. Diagnosis is made from the history, symptoms and signs, from the fever and unusual pallor of the patient and from the blood culture.

TREATMENT.—Penicillin in full doses, often one million units or more every 24 hours, is given over a period of many weeks or even months. Under this treatment a high proportion of cases recover from this formerly incurable disease.

ENDOMETRITIS—See Gynaecology.

ENTERIC FEVER

This is a septicaemia, the bacillus being present in the blood-stream from which it can be cultivated during the first eight days of the illness, before the Widal reaction becomes positive.

The severity of the disease varies greatly both in individual cases and in epidemics. There is wide-spread infectivity as the organism can be isolated from the urine, stools, sile, vomit, sputum and pus from abscesses; this shows that care should be exercised

as to disinfection, in handling the patient and all utensils used in nursing.

As regards treatment, nursing is of the first importance and absolute rest lying down is essential; typhoid patients stand very badly any form of transportation or movement. Careful attention must be paid to the cleanliness of the skin, mouth and fauces.

On the subject of diet there are two schools, one holding that a liquid diet is absolutely essential, the other advocating a liberal diet to increase the resistance and lessen the liability to hæmorrhage and perforation; on the other hand food undigested and unabsorbed will cause dangerous meteorism and diarrhoea. Common sense must guide the doctor in each individual case, as a patient with profound toxæmia and high temperature has little power of digestion.

Milk should be the basis in all severe cases; up to three pints in the 24 hours, divided into two-hourly feeds of 5 oz. each; the milk may be diluted or flavoured with tea or coffee. Water must be taken in considerable quantity between feeds, or orange juice or still lemonade. When there is constipation this should be corrected by giving beef-tea. If the stools show undigested particles or curds, the milk should be citrated by adding sodium citrate 1-2 gr. to the ounce. When additional carbohydrates are required Dextrin-maltose may be added to each feed, or extra calories obtained by adding 1-1½ oz. of cream in the 24 hours.

After the temperature has fallen to normal the patient should be kept recumbent for 14 days, and no addition made to the diet for 7 days; over-feeding is a frequent cause of return of the fever and a relapse.

There is no specific drug treatment; serum or vaccine therapy either intravenous or subcutaneous have no direct effect.

Hydrotherapy in the form of sponging and wet packs is useful in some cases, especially in cases with prolonged pyrexia over 103° F., but the bath involves so much disturbance of the patient that this is not compensated for by reduction in temperature. It has been claimed for hydrotherapy that it stimulates the circulation with a fall in the pulse rate, that there are fewer nervous symptoms such as delirium and tremors, that there is a reduction in the temperature with increased excretion of toxins by the kidneys, that there is less liability to bed-sores, that the initial bronchitis is diminished, and finally that the death rate is reduced. It is contra-indicated in great prostration, hæmorrhage, peritonitis and phlebitis.

Quinine and nascent Chlorine mixture every 4 hours is claimed to produce a shorter course of the disease, a lower temperature and an improved general condition.

TREATMENT OF COMPLICATIONS.—

Myocardial Weakness.—This is shown by rising pulse rate, displacement outwards of the apex beat and alteration of the first sound. Give camphor in oil 2-3 gr., or Coramine hypodermically.

Toxaemia.—Give brandy or whisky up to 4 oz, in the 24 hours.

Vomiting.—This is only common in paratyphoid B. Give iced champagne.

Tympanites.—This is probably due to unsuitable diet. Stop food; give a turpentine or asafœtida enema or pass the rectal tube.

Enemas

R Pure turpentine	3j	R Tr Asafœtida.	3ij
Thin boiled Starch Mucilage	3xij	Starch Mucilage	3iv

In extreme cases pass the stomach tube. Resume feeding with care, commencing with albumin water and whey.

Haemorrhage.—Iced water only by mouth. An immediate injection of Morph. $\frac{1}{4}$ gr., Calcium Chloride 1 gr. in 100 m of sterile water intramuscularly or Haemoplastin 2 c.c. subcutaneously. Drugs by the mouth have apparently little effect, but the following may be tried:

Mixture

R Acid Tannic	gr 10
Tr. Opi	m 10
Spt. Turpentine	m 15
Tr. Chloroform Co.	m 15
Mucilag	3ij
Aqua. Ment. Pip ad	3j
Every two hours.	

Enema

R Tannin	gr. 10
Pulv. Ipecac. Co.	gr. 12
Starch Mucilage	3ij

Constipation.—Beef-tea, or grape juice, beginning with the juice of 15 grapes. Glycerin or cold water enemas. A small dose of castor oil or regular doses of liquid paraffin.

Diarrhoea.—Careful attention to the diet. R Pil. Plumbi cum Opi gr. 2-4 or an enema of R Tr. Opi m 30 with thin cold starch mucilage 3ij.

Perforation.—Immediate laparotomy in some cases gives brilliant results, but the operation must be completed rapidly.

Bed-sores.—Apply a mixture of R Tr. Benzoin, 3ij, Castor Oil 3j.

Sleeplessness and Delirium.—Sponging and Pulv. Ipecac. Co. gr. 12.

Femoral Thrombosis.—Absolute immobility of the leg and thigh, with the application of glycerin of belladonna.

CONVALESCENCE.—In severe cases this is prolonged, and long leave is generally essential.

PROPHYLAXIS.—This by combined typhoid and paratyphoid vaccine is very effective, probable immunity is for 2 years, with partial protection for another 2 years.

ENTROPION.—See Eye.

ENURESIS IN CHILDREN

Many children wet their bed up to the age of two or even three years, when the habit should stop, but some continue up to the age of five or ten years. In the absence of mental deficiency or nervous disease, the outlook is uniformly good. Epilepsy should always be

remembered (but not mentioned to the parent) as a possible cause; in such cases the tongue is often bitten. Intestinal worms are another cause.

TREATMENT.—It is important not to punish or threaten the patient for it only makes him worse, and circumcision, unless there is obvious phimosis, is generally useless. Both the child and the urine should be examined and the confidence of the parent and the child in the doctor established.

Fluid intake should be cut down during the two hours before bedtime, the child should empty its bladder thoroughly at bedtime and should be awakened to do so at 10 p.m.

Belladonna, ergot and ephedrine are all useful, as also are the bromides. Tincture of belladonna should be given at first in a 5-minim dose one hour before bedtime and increased by a minim a day until the condition is cured or until toxic symptoms such as dilatation of the pupils or excessive thirst show themselves.

Liquid extract of ergot may be given similarly, but a dose of 30 minims should not be exceeded.

Half a grain of ephedrine, increasing slowly up to two grains, may also be tried.

The writer has found the following prescription useful for children between 4 and 7 years of age:

R Potass Citrat.	..	..	..	gr. 15
Sod Bromid.	..	..	..	gr. 10
Ephedrin Hydrochlor.	..	..	..	gr. $\frac{1}{2}$
Tinct. Belladonnae	..	..	..	m 7
Extract. Ergotae Liq.	..	..	..	m 5
Syrup Simpl.	..	..	..	5j
Aq. Menth. Pip. ad	..	..	..	5ss

A tablespoonful to be taken an hour before bedtime and increased by 20 drops daily until symptoms are relieved; maximal dose, four tablespoonfuls.

Worms, if present, are treated.

EOSINOPHILIA, TROPICAL

This recently discovered disease is not uncommon on the west coast of India. It usually begins with a week or two of fever, accompanied or soon followed by a dry ineffective hacking cough *which is worse at nights* and greatly disturbs the patient's sleep although he may be almost free from cough in the daytime. Sometimes the attacks are accompanied by wheezing and dyspnoea, like asthma. X-ray pictures show shadows, sometimes at the bases of the lungs, sometimes exactly like the shadow of miliary tuberculosis. (N.B.—Always examine the blood in suspected miliary tuberculosis.)

The cause is unknown; in some cases cheese mites have been found in the sputum, but not by any means in all cases.

If untreated the disease tends to be chronic, some cases having evidently lasted for 10 years or more.

The blood picture is characteristic; the white cells vary between

10,000 and 40,000 per cubic millimetre, and the eosinophils between 30 and 90%.

TREATMENT.—The anti-syphilitic arsenicals produce a rapid cure. The usual treatment is to give six intravenous injections of N.A.B. at weekly intervals, the first dose being 0.3 gramme, the rest 0.45 gramme. The course may have to be repeated after some months or years if symptoms recur.

EPIDIDYMO-ORCHITIS

There are three main kinds: gonorrhoeal, one due to *Bacillus coli*, and tuberculous; the pneumococcus is an occasional cause.

GONORRHOEAL.—Since the advent of chemotherapy this is rare for the simple reason that it commonly begins in the second week of the disease, a stage which it is not allowed to reach nowadays.

Treatment is by rest in bed, Antiphlogistine and chemotherapy.

BACILLUS COLI.—This is not uncommon especially after an injury and is often associated with constipation. Treatment is as for the gonorrhoeal type, but the patient may need some assuring that the disease is not venereal; the same applies to the pneumococcal variety. Penicillin is not effective against *Bacillus coli*.

TUBERCULOUS EPIDIDYMO-ORCHITIS.—This type is always associated with tubercle elsewhere in the genito-urinary tract, the kidney or bladder often being affected and the seminal vesicle on the same side always. Tubercle bacilli may be present in the urine and there are generally sinuses, particularly over the globus major at the upper end of the testicle.

In the present state of our knowledge, treatment is removal of the affected organ.

EPILEPSY

There are two types, *grand mal* and *petit mal*, of which the former is the commoner and the latter the harder to cure.

The prognosis is bad when there is mental degeneration or when the fits cannot be controlled. Otherwise it is good, provided that the patient takes the prescribed drugs regularly and has no fits.

Treatment must not be stopped merely because the fits have stopped, but after *three years* without a fit a gradual withdrawal of drugs is permissible. The later in life the disease begins, the better the prognosis and, in such cases, a definite cause may be found such as injury, tumour, alcoholism, syphilis, uraemia and calcifying *Cysticercus cellulosae* cysts which show on X-ray examination and have occurred chiefly in British soldiers returning from India.

The three main remedies are the bromides, Luminal (Gardenal, phenobarbitone) and sodium diphenylhydantoinate (Dilantin Sodium, Epanutin, Solantoin).

The dose of any of them is the amount necessary to stop the fits without harming the patient in any other way.

Average doses are as follows:

Adults: Bromide 10-30 grains 3 times a day.
Luminal $\frac{1}{4}$ -1 $\frac{1}{2}$ grains twice a day.
Dilantin Sodium 1 $\frac{1}{2}$ grains 3 times a day.

Children: Begin with smaller doses but it may be necessary to work up to the above. Belladonna is also useful for children.

Luminal is probably the best for *petit mal* and Dilantin has cured many cases of *grand mal* that were not amenable to treatment by the other two drugs, and its effect on the patient's intelligence and liveliness is less damping. In children it is important to remove any source of irritation, such as tonsils, adenoids, calcium deficiency, or a tight foreskin, and a ketogenic (high-fat) diet is often of striking benefit.

When changing from one method of treatment to another the new drug should be substituted gradually for the old, for fear that temporary cessation of treatment will produce a fit.

MARRIAGE AND EPILEPSY.—Epileptics often come from a neurotic stock and migraine is common in the parents. The modern view is that the marriage of an otherwise normal epileptic should be discouraged but not forbidden, and that marriage where there is "epilepsy in the family" should be viewed similarly.

EPISTAXIS

In about 80% of cases the bleeding comes from a spot on the septum about a centimetre behind and above the tip; this spot can easily be seen with a headlight or frontal mirror and the bleeding point cauterized under cocaine (without adrenaline, because if the bleeding stops the spot cannot be seen). The actual cautery is preferable to chromic acid or silver nitrate, and an ampoule-opening file held in a pair of forceps and heated in a spirit flame does very well.

As temporary expedients the following are effective. Pinch the nose with a comfortable degree of firmness and apply a wet handkerchief to the bridge of the nose; in severe cases apply some cotton-wool or gauze soaked in adrenaline or snake venom solution to the bleeding area; hydrogen peroxide may be used but is less effective.

If the bleeding persists, plug the anterior nares with ribbon gauze soaked in either of the above solutions, give haemoplastic serum and leave the gauze plug *in situ* for 24 hours. Thrombin Topical may be swabbed on the bleeding point.

Rarely, it is necessary to plug the posterior nares, the easiest way being to cocaineize the nose, pass a fine, lubricated rubber catheter along the floor and catch it when it appears behind the soft palate. A piece of adrenaline gauze is then tied to the catheter by a piece of strong silk or thread and drawn through the posterior nares; a string on the other end facilitates removal through the mouth. Haemoplastic serum is also given and morphia may help in serious cases.

The common cause of nose bleeding is a small abrasion at the bleeding site, due to nose picking, coryza or a dry climate. Other causes are injury, a foreign body (not rare in children, and often associated with a purulent discharge from one nostril), puberty, new growth, high blood-pressure and back pressure from failing heart.

Certain fevers, particularly enteric and malaria, may be associated with epistaxis, and of course, blood diseases such as scurvy, haemophilia, purpura and anaemia.

ERYSIPELAS

The treatment is chemotherapy, both the sulphonamides and penicillin being most effective. Fifty per cent Mag. Sulph.-glycerin paste is applied locally. The general health usually requires attention and a change to the hills should be advised in the hot weather.

EXERCISE

Of exercise in general, it may be said that the necessary amount depends upon individual requirements, which vary enormously. A powerful factor, however, in determining the amount is the quantity of food eaten. The person who eats largely must take plenty of exercise; if this is impossible the amount of food must be reduced. This is an important point with Indians, as it is a matter of experience that those Indians who allow themselves to put on an excessive amount of abdominal fat are very liable to develop diabetes; to avoid this, walking is not sufficient, as the abdominal muscles must be exercised to ensure adequate support of the internal organs and to prevent abdominal venous stasis, which is such a fruitful source of disorders resulting from deficient metabolism.

SWEDISH EXERCISES AND MEDICAL GYMNASTICS

The following General Rules for a Gymnastic Table are recommended by Dr. J. Avredson of the Gymnastic Institute, Stockholm:

1. SPECIAL EXERCISES, i.e., those which have a direct effect on the pathological condition for which treatment is being undertaken.
2. GENERAL.—(a) To increase the vitality of the body as a whole by increasing the supply of oxygen, and so stimulating metabolism. (b) Aiding the digestive organs, and so improving digestion, absorption and ultimately nutrition. (c) To help the general circulation, and so promote the distribution of nutriment and removal of effete products. (d) A promotion of general increase of activity in the cells.

When both special and general exercises have been chosen, they are combined to form a treatment table. The following is a typical scheme:

- (1) Respiratory Movements.
- (2) Limb Movements.
- (3) Movements for Neck and Hand.
- (4) Movements for Abdominal Organs.
- (5) Limb Movements.

followed four-hourly by two tablets, is given at the same time. Under this treatment many a case will appear to be cured within a few hours, but sulphonamide treatment should be maintained for four days or 48 hours after the disappearance of the symptoms.

This ideal treatment is not always possible, in which case both lids should be swabbed with silver nitrate solution 1% (not stronger) in distilled water once a day (never oftener). The eye is also bathed with boric lotion three times a day, the lids are smeared with Vaseline at night to prevent them from sticking and the condition usually clears up within a week. The organic silver preparations, Argyrol and Protargol, may be used in 5% solution as drops instead of the silver nitrate, but are used three times a day, after the eye is bathed. Crookes' Collosol Argentum is the best of the organic silver preparations.

Purulent conjunctivitis of adults is a rare disease nowadays, is often gonococcal and often affects only one eye, so that the other must be protected.

Sulphonamides (e.g., sulphathiazole) by mouth are essential in all cases and must be given in full doses, while local penicillin therapy, as described above, is desirable. Gentle irrigation with warm saline is better than bathing with antiseptics and the lids must be Vaseline'd to allow the free escape of the discharge.

The patient must be kept in bed.

Angular conjunctivitis is a chronic and annoying complaint due to infection with the Morax-Axenfeld bacillus; it is often maintained by uncorrected errors of refraction, exposure to sun, wind and dust, late nights, constant study, indifferent health or alcoholism.

Treatment.—This is to attend to any of the conditions just mentioned and to bathe the eyes morning and night with the following lotion:

R. Zinc. Sulph. gr. 1½
Loto Acid. Boric. ad 3j

The zinc sulphate smartens a little, but this effect passes off as the eye improves. Treatment is kept up for six weeks. The organism is a saprophyte, feeding on dead epithelium, and silver preparations are useless, but penicillin or Albucid drops have an excellent effect. For mild cases of conjunctivitis or for patients with sensitive eyes the following lotions are useful:

R. Sod. Bicarb. gr. 15	R. Liq. Hamamelidis (B.P.C.) 3j
Sod. Biborat. gr. 25	Liq. Adrenalini ʒj
Sod. Chlorid. gr. 30	Glycerin. ʒij
Aq. Camphorae ʒss	Loto Acid. Boric. ad .. 3viii
Aq. Destil. ad 3viij	Mildly astringent and useful for
This is very soothing.	"the morning after the night before".

Normal saline solution and Hydrarg. perchlorid. solution, one in ten thousand, are also useful eye lotions.

OPHTHALMIA NEONATORUM

Only about half the cases are due to the gonococcus, so always take a swab if only for the sake of the parents. The earlier the

disease begins the more severe it is likely to be, but chemotherapy has completely changed the outlook.

TREATMENT.—

- (a) Get a nurse.
- (b) Swab the eyes, gently irrigate them with warm normal saline and Vaseline the lids.
- (c) Give half a tablet ($\frac{1}{2}$ gramme) of sulphathiazole or sulphapyridine in milk immediately and repeat half this dose ($\frac{1}{2}$ tablet) every four hours day and night until 24 hours after the eye is normal, usually 2–5 days.
- (d) Put two drops of 3,000 units per c.c. penicillin solution in each eye every half hour for the first six hours (some authorities direct every five minutes) and then hourly for 12 hours and two-hourly thereafter.
- (e) Burn all infected swabs, disinfect all towels, etc., also your own hands, before and after treatment.

If the above treatment is carried out promptly and conscientiously, 100% cure in a few days can be guaranteed. The necessity for a nurse is obvious.

Penicillin drops (3,000 units per c.c.) half-hourly are equally effective, but great skill is needed or the cornea will be damaged.

PREVENTION.—When the child is born swab the lids with a boric lotion swab and drop into the eyes Protargol or Argyrol 5%, silver nitrate 1%, or, best of all, Collosol Argentum (Crookes). The organic silver preparations are, on the whole, better than silver nitrate, especially if dropped into the eyes once daily for the first five days of the child's life.

TRACHOMA

In Neeam and Williamson-Noble's *Handbook of Ophthalmology* the present writer describes trachoma as "A disease of people who huddle together in dirty surroundings, from which fact the discerning reader will deduce its social and geographical distribution". The discerning reader will also deduce that the first steps in prevention and treatment are to ameliorate the conditions in which patients with trachoma live.

Early trachoma is most frequently seen in children, when the original infection usually occurs; if the upper lid is well everted the typical trachoma follicles will be seen in the upper fornix and a strong light and lens will show the beginning of pannus, i.e., pathological blood-vessels invading the upper edge of the cornea.

The later effects of trachoma, so often seen in India, are largely the results of secondary infection, and include pannus, entropion, trichiasis, corneal opacities, replacement of the conjunctiva by scar tissue and too much canterization.

TREATMENT.—The old treatment of two years of copper sulphate followed by cicatrization with luck is now, mercifully, obsolete, and in cases treated efficiently with suitable sulphonamides a clinical cure can be expected within six months. It must, however,

be realized that once scar tissue has appeared it cannot be replaced in the eye any more than it can be in the skin, so our object is to get cases in the earlier stages and treat them so efficiently that scar tissue and corneal opacities *never appear*.

The sulphonamides, while dealing efficiently with secondary infections, also seem to have an effect on the trachoma virus, although this may be simply because, by keeping down the secondary infections, they give the body a fair chance to overcome the virus. Penicillin, apart from its superb effect on secondary infection, appears to have no action on the trachoma virus.

Sorsby recommends the following method of administering sulphonamides, from which he has had excellent results:

(a) *Early stage*—with follicles and sodden fornices.

- (i) Give one of the newer sulphonamides by mouth, in the usual full doses, for ten days.
- (ii) Under local anaesthesia express the contents of the follicles by means of Tyrrell's or Graddy's forceps.
- (iii) Paint the affected area with 30% sulphacetamide solution (Steramide, Alhucid) or saturated (2%) solution of quinine sulphate in water, three times a day for 7-10 days.
- (iv) Repeat expression of follicles after 14 days, if necessary, and continue painting.

(b) *Later stage*—"Moist eye" with few or no follicles.

- (i) Paint with 30% sulphacetamide once a day and apply 6% sulphacetamide ointment 3 times a day. Alternatively, the conjunctivae may be painted once a day with $\frac{1}{2}$ -2% perchloride of mercury in glycerin, but this is both more painful and less effective.

(c) *Healing stage*—continue with 6% sulphacetamide ointment twice daily.

The newer sulphonamides are available all over India, but as sulphacetamide is not always obtainable an alternative drug has been mentioned in each case.

Unfortunately, the counsels of perfection just advised cannot always be carried out; the man has work, the woman has children, or there is not a bed in the hospital. If the patient were given ten days' supply of sulphonamide to take home with him, very little would go down his throat, most of it would be given to relatives or sold, and a bottle is often valued more highly than the medicine it contains.

In these circumstances the patient should be told to attend at least once a day, when he is given his day's supply of tablets, and drops or ointment are put in the eyes; the progress of the case will usually show whether he is taking his medicine or not.

TREATMENT OF OLD AND CHRONIC CASES.—If there is any appearance of active infection, as shown by the presence of follicles or swelling, treatment is carried out as above; but if, as often

happens, the patient does not appear until the results of chronic trachoma are present, they will require treatment as follows.

First examine the eye, particularly the lids; it will often be found that a few lashes brushing the cornea are largely responsible for maintaining or aggravating inflammation. Examine with a strong light and a magnifying glass to see the state of the conjunctiva, iris, cornea, and lens, which may be cataractous.

Pannus.—Although this is an essential part of the disease, it is often aggravated by conjunctivitis, corneal ulcers, trichiasis, and secondary infection.

Give sulphonamides and vitamin A by mouth. Once a week, under local anaesthesia (two or three drops of 5% cocaine two or three minutes before the injection) give a sub-conjunctival injection of 1-2 c.c. normal saline solution. Some surgeons give oxycyanide of mercury, which causes great pain and often frightens the patient, but has no compensating advantage.

The operation of peritomy is despised by many surgeons, but has its advocates and is harmless. Under local anaesthesia run a pointed stick of silver nitrate round the conjunctiva at the limbus so as to make a track about 2mm. wide.

Sorsby finds that massage of the upper cornea with a glass rod in the earlier stage prevents pannus.

GLARE ASTHENOPIA

There are two varieties, which might be called acute and chronic. In the former, the patient gets pain in the eyes and photophobia when he goes into a bright light; the common cause is angular conjunctivitis, and the treatment is 1% zinc sulphate drops and a pair of glare glasses. In the chronic type the patient suffers from headache and irritability after a day in the sun and may protest against even the slightest light; the cause is debility and nervous strain and the treatment is rest, a change of scene and a pair of glare glasses. In both varieties examine carefully for errors of refraction and correct them if present.

Glare glasses are advisable for anybody who feels uncomfortable or screws up his eyes in the bright Indian sun. Contrary to general belief, people who suffer from glare seldom get accustomed to it; in fact, they are liable to get worse, so there should be no hesitation in prescribing glare glasses; they are both beneficial and comforting.

If, as is usually the case, the patient is to wear glare glasses for a long time, it is worth getting a good pair with any necessary correction incorporated; this has the additional advantage that other people are less likely to take them. For temporary or occasional use the cheap kinds are quite good enough.

NIGHT BLINDNESS

The common cause is shortage of vitamin A, which can be replaced by the mouth, or by injection if absorption from the digestive tract is deficient. Prepalin is a good preparation for injection.

The other chief cause is retinitis pigmentosa, which is diagnosed

by the typical black "bone corpuscle-shaped" areas in the retina; the condition is hereditary, most often being seen in the children of related parents; it is also incurable and slowly progressive, the patient usually being blind before sixty.

Opium eaters are liable to night blindness because the opium contracts their pupils, sometimes to pin-point size.

Night blindness due to other causes such as choroiditis, cataract and retinitis punctata albescens is associated with day blindness.

The condition is often simulated by people trying to be excused night duty. An examination should be carried out in the dark-room and an obstacle surreptitiously placed in the patient's way; much cunning may be needed to detect the malingerer.

Full night vision takes about 45 minutes to develop, but adequate central dark-adaptation takes place in 3-8 minutes.

TRICHIASIS

A few lashes may be removed by electrolysis under local infiltration anaesthesia, but this is not always easy if there is much scar tissue.

ENTROPION—UPPER LID

Of the many operations for this condition, the writer has found Anagnostica's the best. It is carried out under local infiltration

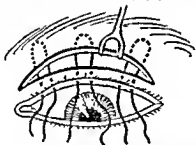


Fig. 7.—Method of passing sutures in Anagnostica's operation.
anaesthesia combined with a few drops of 5% cocaine in the eye as follows

- (a) Evert the upper lid over an eyelid retractor.
- (b) About 2 millimetres from the edge make a longitudinal incision through the conjunctiva down to the tarsal plate along its whole length. An old cataract knife is generally used.
- (c) Remove the lid retractor and insert a shoe-born shaped or flat spatula, which the assistant holds. (The use of haemostatic forceps, e.g., Snellen's, prevents haemorrhage, but the forceps often do not allow the operation to be carried right to the ends of the cartilage or high enough under the upper lid.)
- (d) Make an incision corresponding to that already made through the conjunctiva.
- (e) Dissect the skin and fibrous tissue off the tarsal plate; undermine the skin upwards for about a centimetre and attend to bleeding points.

- (f) Make a sloping incision right along the tarsal plate, going almost but not quite through it.
- (g) Make another incision parallel to the first but sloping in the opposite direction, so that it meets the deepest part of the first incision, thus forming a miniature trench right along the cartilage.
- (h) Pick up one end of the loosened strip with a pair of fixation forceps and excise it with a pair of "curved-on-the-flat" eye scissors.
- (i) Pass a horsehair stitch through the mid-point of the edge of the lid just behind the lashes and bring it out in the wound (see Fig. 7). High up under the undermined skin, pass the stitch through the muscular and connective tissue and bring it out through the incision.

Pass the stitch from the wound through the lid margin so that it emerges about two millimetres from where it originally went in.

- (j) Pass two similar stitches, one near each canthus.
- (k) Tie the stitches, when the lid margin will be seen to evert.
- (l) Fix the long ends of the stitches to the forehead with a piece of sticking plaster so as to maintain eversion of the lid.
- (m) Apply Cibazol ointment and a pad and bandage.
- (n) Remove the bandage and stitches after about 10 days.

Lower lid.—It is generally sufficient to excise a crescent-shaped piece of skin from just below the lid margin and sew up the resulting wound.

SPRING CATARRH

This has a superficial resemblance to trachoma, but occurs in the spring, and chiefly affects the tarsal conjunctiva, "pavement stone" follicles being present; there are three important diagnostic points: (1) there is no pannus, (2) there are usually some follicles situated at the limbus, running along one side of the cornea, and (3) a swab from the affected area shows large numbers of eosinophils.

Treatment is unsatisfactory, but a change of climate and place may help. Radium has been used with great success in some cases but without effect in others. It must be applied by an expert or damage will be done to the eye.

Acetic acid, adrenaline and Hazeline are the classical remedies, but the results are often disappointing; the following prescription may be tried, or any of the drugs may be used alone.

R. Acid Acetic.	Dil			
Liquor. Adrenalin	Hydrochlor.	}	..	.. grm 30
Liquor. Hamamelidis		}		
Aq. ad	..	..	..	3j

Ft. eye drops. To be used frequently.

Ten grains of cocaine hydrochloride may be added if the irritation is severe.

Under cocaine anaesthesia, carbon dioxide snow may be applied

Under cocaine-adrenaline anaesthesia raise the pterygium with a pair of fixation forceps and pass a squint book through its base. With the squint book tear out the pterygium from the cornea and cut off the tag so formed; stitches are unnecessary. Kamel's method is to dissect the pterygium very carefully and thoroughly from the cornea, and then with a pair of scissors to undermine it right up to its origin at the canthus. The under-surface is lightly swabbed with pure carbolic acid and allowed to fall into place, redundant tissue being excised.

Leucoma.—If this obstructs vision, do optical iridectomy.

IRITIS, IRIDO-CYCLITIS

Inflammation of the iris, usually associated with inflammation of the ciliary body, may be due to syphilis (secondary stage or congenital) or to gonorrhoea (prostatitis or posterior urethritis), so these conditions should always be looked for and tactfully enquired about, but nowadays a far more common cause is a septic focus, usually somewhere near the affected eye. The sinuses, teeth and tonsils, therefore, must be examined with the very greatest care, any suspicious lesion treated and, if possible, a vaccine made from the infected spot; sulphonamides are also given.

Local treatment is with 2% atropine drops or ointment, so as to keep the pupil widely dilated and prevent the formation of posterior synechiae (adhesions between the iris and the lens capsule).

Considerable success has attended the use of daily sub-conjunctival injections of penicillin, 500 units in half a c.c. of sterile water. Hot fomentations relieve pain and help to cure.

GLAUCOMA

This may be acute or chronic, the former being intensely painful; both are preventible, but are unfortunately common causes of blindness.

Acute glaucoma is associated with redness, pain and tenderness of the eye, and a rise in tension, detectable when the eyeball is gently palpated with the two index fingers and compared with a normal eye.

Treatment is by eserine or Prostigmin drops, followed by a wide iridectomy.

Treatment of chronic glaucoma, when sight remains, is by sclero-corneal trephining or iridencleisis, a neat and easy operation which bids fair to replace trephining. It is performed as follows.

- Dissect off a wide flap of conjunctiva above and down to the cornea.
- Insert the point of a cataract knife into the anterior chamber, under the flap at the sclero-corneal junction and make an incision about 3 mm. long.
- With a pair of iris forceps withdraw a segment of iris and cut it in half with a pair of iris scissors.
- With an iris repositor tuck one end of the iris back but leave the other in the wound.
- Replace the conjunctival flap and close the eye.

POINTS OF DIFFERENCE BETWEEN CONJUNCTIVITIS,
IRIDO-CYCLITIS AND GLAUCOMA

	<i>Conjunctivitis</i>	<i>Irido-cyclitis</i>	<i>Glaucoma</i>
Redness	Most marked away from pupil and on lids	Most marked round pupil Lids not affected	Most marked round pupil. Whole eye red in acute cases
Chemosis	Present in severe cases	Absent	Present in severe cases
Discharge	Muco-purulent or purulent	Watery, due to lacerimation	Watery, due to lacerimation
Organisms and Leucocytes	Abundant	Few or absent	Few or absent
Pain	Moderate	Severe	May be very severe
Photophobia	Slight	Marked	Variable
Vision	Unaffected	Variable	Fields contracted
Cornea	Normal	Usually normal	May be steamy and anaesthetic
Anterior chamber	Normal	"Keratic precipitates" seen as white dots in lower part with strong lens and light	Shallow Keratic precipitates absent
Iris	Normal	Contracted	Dilated, often does not react to light
Tension	Normal	Normal	Raised
Optic disc	Normal	Normal	Cupped, may be white
Lens	Normal	Iris may be adherent	May be cataractous or greenish

A mydriatic must not be put into the eye until it is quite certain that there is no glaucoma.

Finally, the association of vomiting with severe pain and redness in one eye indicates acute glaucoma.

INFECTIONS OF THE EYELIDS

STYES (Chalazion).—These are often kept up by an uncorrected error of refraction, so if a patient suffers frequently from styes the refraction should be carefully examined and, if need be, corrected.

Local treatment is to bathe the eye with boric lotion two or three times a day and to apply sulphathiazole or, preferably, penicillin ointment. The styne should be pricked with a cataract knife, when it points but not before.

The general health may need toning up or a change of air may be required.

Sulphonamides by mouth, in the writer's experience, have been disappointing, but occasionally a dramatic success has been scored by Stannoxyl treatment; an autogenous vaccine should always be made and given in chronic cases.

Blepharitis responds very well to penicillin or sulphathiazole ointment. Boric washes are also given.

CATARACT

For practical purposes the varieties are congenital, juvenile, traumatic, diabetic and senile.

CONGENITAL CATARACT.—This is usually in the centre of the lens, at either the anterior or the posterior pole or in the nucleus: the lamellar variety consists of a layer of dense tissue enclosing the nucleus. Clinically, the point of interest is that a congenital cataract is *both stationary and soft*, so either no treatment or treatment by needling—sometimes repeated several times—is advised because the soft remnants of the lens absorb in time.

JUVENILE CATARACT.—This appears in children or adolescents and is either hereditary or traumatic. Treatment is by needling as a rule.

TRAUMATIC CATARACT.—This term explains itself; the injury may be the result of inflammation such as a perforating ulcer.

DIABETIC CATARACT.—This may be suspected in a youngish person, but the urine is tested in all cases.

SENILE CATARACT.—This commonly begins at the periphery like the spokes of a wheel, and gradually involves the whole lens; occasionally it begins in the centre, but the result is the same.

The cause is unknown, but it tends to run in families and is commonest in hot, dry regions (compare "glass-blower's cataract"). Avitaminosis has been alleged to be a cause of cataract (and of most other things) but there is no proof.

PRELIMINARY EXAMINATION

- (a) To tell whether a lens is "ripe" shine a torch on to the eye from one side; if the lens is ripe, and therefore completely cataractous, the opaque surface is in contact with the back of the iris, so the iris throws no shadow on the lens.
- (b) Test the reaction of the pupil. If this is brisk, all is well; if it is sluggish but the patient can localize the source of light all is well; if it is absent and the patient can localize the source of light, there are probably iris adhesions (synechiae), so there is a "complicated cataract"; if there is no reaction and no perception of light, operation will be useless—it is probably a case of old glaucoma and certainly a case of optic atrophy.
- (c) Estimate the tension with the fingers, as follows. Tell the patient to look down and with the two forefingers lightly press on the upper eyelid; after a little practice it is easy to detect raised tension in the globe and there are always plenty of normal eyes about for comparison. Whenever possible the tension should be taken with a tonometer (Maclean's is the best).
- (d) Examine the lids for conjunctivitis; if this is present it must be treated before operation is safe. Old trachoma is no bar to operation if the eye is otherwise clean.
- (e) Press over the lacrimal sac below the inner canthus and watch the punctum lacrimale; if pus or muco-pus comes out, the sac must be treated.

- (f) Take the patient's blood-pressure; if this is high, it should be reduced by saline purgation for a few days. Choroidal haemorrhage may occur after cataract extraction even with a normal blood-pressure.

PREPARATION OF THE PATIENT.—Each surgeon has his own preferences, but the more elaborate methods of safeguarding the eye against accident and sepsis are not possible when one is operating on large numbers of poor patients, who may have come far in order to have their only chance of recovering sight.

A quiet patient is essential to success, so the writer generally manages to give even the humblest a drachm and a half of bromide the night before, and a drachm and a half of paraldehyde two hours before the operation.

PREPARATION OF THE EYE.—For 48 hours before and after operation give one of the newer sulphonamides, but stop it *at once* if it causes nausea or vomiting, because post-operative vomiting is far worse than a slightly increased risk of sepsis.

The night before operation the face and eyelids are well washed with soap and water or, preferably, 1% Cetavlon, the lashes of the affected eye are cut short, and a few drops of penicillin, 3,000 units per c.c., put into the eye.

During the three hours before operation a few drops of the penicillin solution are put into the eye every half hour.

When the patient is on the table, irrigate the eye with normal saline from a can three feet above the table, massage the lids between the finger and thumb to squeeze out Meibomian secretion, and press the lacrimal sac to make finally sure that it is healthy.

Immediately before making the incision, and again at the end of the operation, put in a few more drops of penicillin.

In the absence of penicillin, irrigate the eye with 1:4,000 or 1:2,000 perchloride of mercury lotion instead of saline.

NOTE ON ANAESTHETIZING THE EYE FOR CATARACT OPERATION

Drops are put in 3–4 times at five minute intervals; cocaine 5%, Planocaine 6% or Anethaine 1% may be used, and a few drops of adrenaline are put in after the last anaesthetic drops. Planocaine and Anethaine do not damage the cornea. *Retro-orbital block* anaesthetizes the deeper structures of the eye, such as the iris, so is generally used; it is carried out as follows.

After the second application of local anaesthetic, draw down the patient's lower eyelid and tell him to look inwards. Insert the needle in the fold of conjunctiva that appears when the lower lid is drawn down (see Fig. 8) and pass the point round the globe in an upward and inward direction until it is judged to be behind the globe, then inject 1 c.c. of 2% Novocain and withdraw the needle.

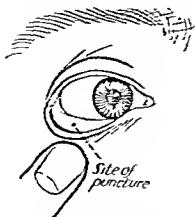


Fig. 8.—Retro-ocular block.

BLOCKING THE FACIAL NERVE.—This is a necessity in *all* intra-capsular operations whether the patient seems likely to “squeeze” or not, in all capsulotomy cases where the patient seems likely to squeeze, and is a great comfort in other cases. It is carried out as follows.

Tell the patient (who may be deaf) to open his mouth; feel the depression which appears behind the condyle of the jaw, then, avoiding the superficial temporal artery, inject 2 c.c. of local anaesthetic at the site of this depression and at a depth of about a centimetre; wait five minutes.

Some surgeons put a stitch through the upper lid and fix the stitch with sticking plaster after the operation so as to keep the eye shut, but with proper application of the pad and bandage this is generally unnecessary.

OPERATION.—Much discussion goes on about the relative merits of the intra-capsular and the capsulotomy operation. The former is most popular in the north of India, and the latter in the south. After doing several thousand, the writer finds that he has done about two intra-capsular to one capsulotomy and that with increasing experience he tends to favour Shroff's method of doing the capsulotomy operation as being the most consistently safe over large series of cases. A wise old surgeon once advised the writer, “always do a capsulotomy in a private case”.

Even the experienced surgeon must never be prejudiced in favour of any particular operation and he should always be willing to learn anything that may help his patients; each case must be treated on its merits.

When doing a cataract operation the surgeon must remain calm, must never try to hurry and above all, must never try to show off, or disaster will follow. The patient's eye is what matters and the better the results the better the surgeon's reputation.

The extracting of cataracts is learnt in the operating theatre, so only the main points of the two operations recommended will be given here.

After the preparation described above and with the help of two assistants, one of whom holds a powerful torch or "hammer lamp", the surgeon begins the operation.

SHROFF'S METHOD.—

- (a) Insert the speculum, which is lightly held by the assistant.
- (b) Hold the eye with a fixation forceps at "6-o'clock" and draw it downwards and forwards.
- (c) Insert the point of the knife at the limbus, at "9-o'clock" in the right eye, and "3-o'clock" in the left eye (the outer side).
- (d) Dip the point of the knife into the capsule of the lens and cut it. The point must be very sharp and the incision in the capsule made gently, otherwise the lens may be dislocated.
- (e) Bring out the point of the knife opposite to where it went in, but *apparently* about a millimetre in front of the limbus, which will make the point emerge at the limbus.
- (f) Drawing the eye well down with the fixation forceps, cut upwards so as to make the conjunctival bridge as long and as wide as possible.
- (g) Remove the fixation forceps and tell the patient to look down.
- (h) Pressing lightly with an iris repositor at "12-o'clock" under the conjunctival bridge, and with a spoon at "6-o'clock", express the lens nucleus.
- (i) Irrigate the anterior chamber with warm sterile normal saline solution until all lens matter has been washed out. The best irrigator is a small silver one attached by a rubber tube to a flask fitted like a reversed Junker's inhaler, pressure on the bulb causing the saline to squirt through the irrigator.
- (j) Perform a small peripheral iridectomy as nearly as possible at "12-o'clock". (This may be omitted, if it is very difficult, if the patient is behaving badly, or if the surgeon is inexperienced, but it greatly minimizes the risk of iris prolapse and of post-operative glaucoma, so is advisable in most cases.)
- (k) If the anterior chamber is not clear, irrigate again.
- (l) Replace the iris, make sure the conjunctival bridge is not curled at the edges, remove the speculum and close the eye.

It is usual to put in a drop of atropine when iridectomy has been done or eserine if not, but the writer generally omits this.

INTRA-CAPSULAR EXTRACTION OF CATARACT.—Amongst the aged in India, the suspensory ligament of the lens is peculiarly fragile, so extraction of the lens in the capsule is relatively easy.

The advantages of the operation are that an immature cataract can be extracted and that no after-cataract occurs, that it is a less messy operation than capsulotomy and that it is less liable to be followed by sepsis. It is, however, less easy to perform successfully, and even in the most skilled hands loss of vitreous is commoner than with capsulotomy.

The following are *unsuitable* for the intra-capsular operation:

- (a) Patients below the age of fifty years.
- (b) Patients with prominent eyes or high myopia; the vitreous is usually fluid and will escape.
- (c) Patients with slightly raised tension (over 35 MacLean). (If the tension is over 40 glaucoma is present and a preliminary iridectomy must be done.)
- (d) Patients in whom the lens is seen to come forward during the section, a sure sign of fluid vitreous.
- (e) Patients with a tremulous iris, another sign of fluid vitreous if the lens is present.
- (f) Patients who behave badly on the table.
- (g) As after-treatment is possible, most surgeons prefer the capsulotomy operation for private patients.

Finally, only the experienced surgeon should attempt to remove a hypermature (Morgagnian) lens in the capsule.

The beginner should start the intra-capsular operation only after he has mastered the capsulotomy technique and only when he is being instructed by an acknowledged master of the operation. His early patients should be old and peaceful, should have a well matured, hard or pigmented cataract, *and should have good vision in the other eye*.

The writer's method is briefly as follows. After the necessary preliminaries, including facial nerve block:

- (a) Insert the speculum, catch the conjunctiva at "6-o'clock" with a pair of fixation forceps and draw the eye downwards and forwards.
- (b) Make a *full half circle* incision beginning a hair's breadth in front of the limbus and ending with a small conjunctival flap at the top. Less than half a circle invites danger from dipped lens or from escape of vitreous, owing to excessive pressure.
- (c) Make a small peripheral iridectomy. (Note that in this operation the iridectomy is done *before* the lens is extracted.)
- (d) Remove the speculum and fixation forceps and put in a lid hook, with which the assistant holds the upper lid away from the globe while he draws the lower lid down with his thumb.
- (e) Press on the sclera with a small vectis at "4-o'clock" and with the point of a hook at "6-o'clock" (note that the instruments and positions are different from those in capsulotomy) the lower edge of the lens now comes forward, the lens "tumbles" and is easily expressed from the anterior chamber by following it up with the hook.

- (f) Raise the corneal flap with an iris repositor and the iris falls back into position.
- (g) See that the cornea and conjunctival flap are in position, tell the assistant to remove the lid hook, and close the eye.

Alternatively, the lens may be loosened with capsule forceps, of which Arruga's are far the best, and then either pressed out with a hook (*author's method*) or drawn out with the forceps; the latter manoeuvre is not so easy as it sounds—the lens has to be rotated and great delicacy is needed to avoid tearing the capsule.

If vitreous escapes penicillin should be put in the eye, as loss of vitreous, apart from usually being ultimately followed by retinal atrophy, is likely to be followed by sepsis. If vitreous presents or escapes before the lens is delivered, pass a small vectis behind the lens and very gently lift it out; the appearance of vitreous is an urgent signal for the immediate release of all pressure; further pressure would only push out more vitreous, but not the lens. A general anaesthetic is often a great help in these cases.

IRIDECTOMY

This little operation is performed as follows.

- (a) After the usual preliminaries, including insertion of a speculum, catch the conjunctiva with a fixation forceps at the opposite side of the cornea to that of the proposed iridectomy.
- (b) With a cataract knife make an incision about 3 mm. long at the sclero-corneal junction, raising a small conjunctival flap.
- (c) If the iris is not adherent, gently tap the sclera with the handle of the knife near the incision, when the iris generally pops out. If the iris is adherent or will not come out, insert a pair of iris forceps, pick up the iris by its inner edge, and draw it out of the wound.
- (d) Holding the iris in the forceps, cut off the part outside the wound, holding the scissors radially.
- (e) Reposit the iris in the anterior chamber, stroke the cornea so as to widen the gap in the iris, and close the eye.

In a case of acute glaucoma, let the aqueous fluid escape slowly, or there may be a choroidal haemorrhage. When the iris is caught in the forceps, tear a little away from its insertion and divide it by two snips with the scissors.

DACRYOCYSTITIS

This is suspected if there is a slight swelling below the inner canthus and confirmed if pressure over the swelling causes pus or muco-pus to come out of the punctum lacrimale.

TREATMENT.—Excision of the sac is generally required, but success has been achieved by irrigating the sac with penicillin solution, 3,000 units per c.c., aided by chemotherapy.

Irrigation of the lacrimal sac.—Under cocaine anaesthesia, dilate the punctum lacrimale with a Nettleship's dilator, which has a

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cone-shaped point; the dilator is inserted at right angles to the skin and twiddled round between the operator's finger and thumb. The point is then turned inwards to follow the course of the canaliculus, which takes a right-angled bend about 2 mm. from the punctum.

A very good irrigating cannula can be made from an ordinary hypodermic needle by honing or grinding the end so that instead of being pointed it is smooth and round; the end of the needle is then slightly bent.

Insert the cannula, with a 2 or 5 c.c. syringe attached, in the same direction as the dilator and rinse the sac through with saline, the patient holding his head forward so that the solution runs out of his nose, then instil about half a c.c. of the penicillin solution. The operation is repeated daily for about a week. To make certain that the duct is patent, add a little fluorescein or mercurochrome to the irrigation saline.

Exposure of the lacrimal sac.—The important thing in finding the sac is to know its exact whereabouts, which is just inside the orbit, between the internal tarsal ligament and the floor, and just behind the lacrimal crest. The steps of the operation are briefly as follows.

- (a) Palpate the internal tarsal ligament (inner canthus) and the lower margin of the orbit.
- (b) Inject a local anaesthetic containing adrenaline.
- (c) Make a curved incision about 2 cm. long along the inner lower margin of the orbit, starting above at the internal tarsal ligament.
- (d) Incise the orbicularis oculi in the direction of its fibres and insert the lacrimal sac speculum.
- (e) Deepen the dissection until the internal tarsal ligament is clearly seen.
- (f) By blunt dissection below and behind the internal tarsal ligament expose the sac, which has a glistening appearance; the tarsal ligament generally has to be cut.

Subsequent steps depend upon individual taste. Most surgeons dissect out the sac by blunt dissection, remove it, cauterize any remains, and pass a large lacrimal probe down the lacrimal duct into the nose. Others make a hole into the nose, open the sac and stitch its mucous membrane to that of the nose. The wound is then dusted with a sulphonamide or Cibazol powder and sewn up.

ANTERIOR STAPHYLOMA

Although nothing can be done to restore sight when this ugly and uncomfortable swelling is present, it can be made less hideous and uncomfortable by excision.

OPERATION.—From above downwards, thrust four curved, cutting surgical needles, threaded with black cotton, at equal distances from each other through the base of the swelling, so as to impale it. Cut off the swelling with a pair of scissors, push the needles right through, and tie the sutures. The anaesthetic may be retro-orbital, hexobarbitone or ethyl chloride.

EXCISION OF THE EYE

- (a) Give a general anaesthetic.
- (b) Insert a speculum.
- (c) With a pair of fixation forceps, raise the conjunctiva as near the limbus as possible and cut it with scissors.
- (d) Insert both blades of the ophthalmic scissors beneath the conjunctiva, and alternately separate it from the sclerotic and cut, until the incision completely encircles the cornea.
- (e) Rotate the eye outwards with a pair of fixation forceps, pass a squint hook between the conjunctiva and the globe at the inner side, and catch up the internal rectus muscle.
- (f) Cut the internal rectus, and treat the other muscles similarly.
- (g) Press with the speculum; this dislocates the eye out of its socket.
- (h) Rotate the eye inwards and pass a pair of open blunt, curved scissors behind the eye from the outer side.
- (i) Cut the optic nerve and any remnants of tissue and remove the eye.
- (j) Attend to haemostasis, pinch the edges of the conjunctiva together, pack the socket with sulphonamide-Vaseline gauze and apply a bandage.

EVISCERATION

This is done when there is severe inflammation which might spread into the skull if enucleation were done. Incidentally, it gives a better cosmetic result, especially in clean cases where a Mule's glass ball can be used.

METHOD.—Insert a speculum, hold the eye with a fixation forceps, plunge a cataract knife into the eye near the limbus, cut right round and remove the cornea, ciliary body and iris and scoop and irrigate the contents of the globe. Pack lightly with sulphonamide-Vaseline gauze.

SYMPATHETIC OPHTHALMIA

This condition is not common in India. Important points are:

- (a) The incubation period probably is not less than 14 days from the date of the causative injury in the other eye, most commonly 4–8 weeks.
- (b) It can appear two or three days after the causative eye has been removed.
- (c) *It follows the entrance and retention of a foreign body, or a penetrating injury, particularly in the area of the ciliary body, with prolapse of the iris or part of the uveal tract.*
- (d) When sympathetic ophthalmia begins it often progresses to complete blindness, while the causative eye may recover a considerable amount of vision.
- (e) Acute suppuration in one eye does not cause sympathetic ophthalmia in the other. From this one can deduce certain rules.

PREVENTION.—We have at least 10 days after the injury in which to decide about removing the causative eye in a doubtful case.

Foreign bodies must be removed from an eye whenever possible.

Prolapsing structures must be snipped off or returned when possible. In the case of prolapsed iris half-hourly eserine will sometimes draw it away from a wound near the limbus or atropine from a wound near the centre of the cornea. Wounds in the ciliary area must be thoroughly cleansed, preferably with penicillin (2,500 units per c.c.) and covered with a conjunctival flap.

A hopelessly damaged eye, or one from which vitreous is escaping, should be removed.

An eye with a penetrating wound or a foreign body which shows no signs of improvement at the end of 10–14 days should be removed.

If sympathetic ophthalmia occurs and there is vision in the causative eye this should on no account be removed.

In all cases likely to produce sympathetic ophthalmia active chemotherapy must be carried out. Weekly injections of N.A.B. or Mapharside are also of use.

THE EYE IN MEDICAL DIAGNOSIS (E. J. O'M.)

LIDS.—Oedema of, if not due to a local cause is probably renal.

PTOSIS—This may be traumatic, congenital or trachomatous, or due to third nerve paralysis from syphilis or of cerebral origin.

CORNEA.—An interstitial keratitis as shown by a diffuse nebulæ is syphilitic, while phlyctenular ulcers in children are generally tuberculous.

SCLERA.—Inflammation is usually either tuberculous or syphilitic.

PUPIL AND IRIS.—These may give valuable information as to disease of the central nervous system.

INEQUALITY OF THE PUPILS.—This combined with excessive contraction, if not due to injury is suggestive of tabes or G.P.I. Periodically contracted pupils may indicate the morphia habit. Argyll-Robertson pupils react to convergence but not to light, and are seen in syphilis of the central nervous system—tabes and G.P.I.

LENS.—Cataract is due to several causes of which diabetes is one. As diabetic patients are easily attacked by infections, it is of great importance before an operation to make certain that the eye is bacteriologically clean.

OCULAR MUSCLES.—The sixth nerve is often involved in injury especially fracture of the base of the skull.

Diplopia is the principal symptom of paralysis of the ocular muscles and the cause of the paralysis may be situated in any part of the tract from the cortex to the muscles.

The general principle is that conjugate ocular movements are cortical in origin; on the other hand nuclear and peripheral lesions involve the motor power of a single muscle or muscles corresponding with the nerve supply affected. The causes are syphilis, parasyphilis, disseminated sclerosis, haemorrhage, tumour and certain peripheral causes such as diphtheria and other infective conditions.

OCULO-MOTOR PARALYSIS, CAUSES OF

1. **LIMITATION OF MOVEMENT**, e.g., if the left external rectus is paralysed, deficient movement of the left eye outwards.

2. **STRABISMUS**, i.e., want of correspondence of visual axes.

(A) Convergent.

(B) Divergent.

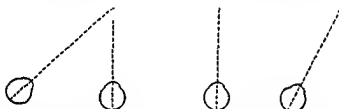


Fig. 9.—(a) Convergent (e.g., paralysis of left external rectus).

(b) Divergent (e.g., paralysis of right internal rectus).

3. **DIPLOPIA**, i.e., double vision, i.e., separate vision with each eye.

(A) Homonymous, or Simple. (C) Convergent Strabismus.

(B) Crossed Diplopia.

(D) Divergent Strabismus.

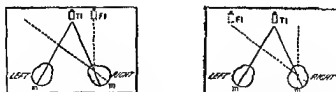


Fig. 10.—(a) Simple (e.g., paralysis of left external rectus)

(b) Crossed (e.g., paralysis of right internal rectus).

TI, True Image; *FI*, False Image; *m*, Macula.

4. SECONDARY DEVIATION.—

- (1) Sound eye is made to fix the object.
- (2) Position of that eye is noted.
- (3) Close that eye.
- (4) Fix the object with paralysed eye.

- (5) Open the sound eye and it will have changed its position, having moved in the direction of the object.



Fig. 11.—Paralysis of left external rectus (secondary deviation by the opposite internal rectus).

5. **ERRONEOUS PROJECTION.**—Position of object judged by movements of eye-balls and amount of nerve-force expended to cause these movements; e.g., if left external rectus is paralysed, an object, to the left of eye, will appear further off to the left than it really is;

e.g., *Paralysis of Left External Rectus.*—

- (1) Limitation of movement of the left eye outwards to the left.
- (2) Convergent strabismus.
- (3) Simple diplopia.
- (4) Secondary deviation of opposite internal rectus.
- (5) Erroneous projection to the left.

NYSTAGMUS

This may be congenital or acquired. It consists in the rhythmical movements of the eye, which movements are involuntary, frequent, and usually bilateral; produced by alternate contractions of opposing muscles.

CAUSES OF, ARE:

1. LOCAL AFFECTIONS OF THE EYE.—

- (1) Which interfere with sight, opacity of cornea or lens.
- (2) Diseases of the retina and choroid.

2. MINERS.—Due to their position during work.

3. ALBINISM.

4. DISEASES OF THE NERVOUS SYSTEM (in all, these movements cease during sleep).—

- | | |
|-----------------------------|----------------------------------|
| (1) Hereditary ataxy. | (5) Hydrocephalus. |
| (2) Cerebellar lesions. | (6) Thrombosis of lateral sinus. |
| (3) Disseminated sclerosis. | (7) Meningitis. |
| (4) Acute poliomyelitis. | (8) Syringomyelia. |

FIELD OF VISION

The two important signs are: (1) Homonymous hemianopia; (2) Bi-temporal loss of field. A blind or partly blind central area for specks of colour with full peripheral field of vision points to poisoning by alcohol, tobacco or diabetes, retro-bulbar neuritis from sinusitis, disseminated sclerosis or tabes.

ERRORS OF REFRACTION AND MUSCLE BALANCE

Headaches and neuralgias are certainly caused by these conditions in a large proportion of patients.

EXAMINATION WITH THE OPHTHALMOSCOPE

This reveals changes in (a) optic nerve, (b) retina, (c) blood-vessels, and (d) choroid. Three conditions of the optic nerve must be considered, i.e., papilloedema, neuritis and atrophy.

PAPILLOEDEMA.—This is due to increased intracranial pressure from any cause such as tumour, meningitis, abscess and gumma. There is marked striation of the margins of the disc, the nerve head is very definitely swollen and stands above the level of the retina. The condition is bilateral but does not cause much interference with vision; it is due to oedema caused by increased intracranial pressure, transmitted to the subdural space of the sheaths of the optic nerves.

OPTIC NEURITIS.—This is due to toxæmia, nephritis, diabetes, syphilis, influenza and focal septic conditions. The swelling of the nerve is much less than in papilloedema, but the retina is frequently involved showing hæmorrhages and exudates; the condition is frequently unilateral and there is marked diminution of vision.

OPTIC ATROPHY.—This may be primary as in tabes, G.P.I., etc., when the disc is a greyish-white colour with clearly defined margins and unaltered blood-vessels, or secondary due to previous optic neuritis in which the inflammatory exudate has organized into fibrous tissue.

RETINA.—Retinal inflammation is principally caused by nephritis—all its varieties—diabetes and syphilis. Albuminuric retinitis is generally seen as papillitis, sometimes as intense as that seen in cerebral tumour, there are flame-shaped hæmorrhages and radiating star-like white lines at the macula. In diabetes, papillitis is rare; instead of being flame-shaped, hæmorrhages are discrete round spots. Syphilis is usually seen as a diffuse cloudiness of the retina and fine opacities in the vitreous.

BLOOD-VESSELS.—These at once give evidence of general disease, such as arteriosclerosis and high blood-pressure, the thickened arteries compressing the veins at the point of crossing, and variations in the calibre of the arteries.

THE CHOROID.—Tuberculosis and syphilis are the two important diseases, the former showing large solitary areas of atrophy, and the latter scattered patches of choroido-retinitis edged with pigment.

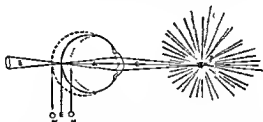
ERRORS OF REFRACTION

By **LIEUT.-COLONEL H. KIRKPATRICK, I.M.S. (Retired)**

Late Superintendent of the Government Ophthalmic Hospital,
Madras and Professor of Ophthalmology in the Madras
Medical College

The image of an object must be sharply focused on the retina, in order that it may be clearly perceived by the eye.

Any object may be regarded as being composed of a number of points. Rays of light, which illuminate an opaque object, are reflected in various directions from each of such points. Rays, which enter the pupil after being reflected from a point, are bent towards each other by the refractive media so as to form a cone-shaped bundle; an image of the point is formed at the apex of this cone (*the principal focus* in the case of parallel rays); and an image of the whole object is formed by a series of such apices. The refracted rays intersect at the apex of the cone, and, if their path is unobstructed, they then diverge so as to form a second cone-shaped bundle whose apex is continuous with that of the first. Rays reflected from a point further distant than six metres (or 20 ft.) are parallel, or nearly so, as they enter the eye (the more divergent are cut off by the pupil); those whose source is nearer than this are divergent; and the closer the point lies to the eye, the greater is the divergence. Given the same degree of refraction, the cone formed by such divergent rays will be longer than that formed by parallel rays.



Normally, the apex of the cone formed by parallel rays lies upon the retina, and so focuses sharply the image of a point (*Emmetropia*); but, either owing to a change in refractive power, or to an abnormality in the length of the eyeball, the apex (focus) may lie (1) in front of the retina (*Myopia*), or (2) behind the retina (*Hypermetropia*). The point does not form a clear image in these last two conditions, but appears as a diffused circle (*Diffusion Circle*). This is because the cone of rays in hypermetropia is cut by the retina before its apex has formed; and in myopia the secondary cone, which is formed after the intersection of the rays, is met by the retina at a place behind its apex.

In hypermetropia, the cone formed by parallel rays coming from a point further distant than six metres, is too long for the eye, whereas in myopia it is too short; that is to say, the hypermetropic eye is too short, whereas the myopic eye is too long.

Rays which are already convergent as they enter the eye will form a shorter cone than that formed by parallel rays, and, as previously stated, those already divergent will form a longer one. Rays coming from a point closer than 20 ft. being divergent, a sharp focus upon the retina of a myopic eye is formed of the rays reflected from a point placed at a suitable distance (*the Far point*)

near the eye. This image is obtained without any accommodative effort, since the myopic eye, even when at rest, is focused for divergent rays. No clear image of an object situated beyond this distance can be formed in myopia, however, without the aid of a concave lens to render the entrant rays divergent.

The amount of myopia in a given case can be estimated subjectively by measuring the distance of the "far point" from the eye, and by dividing one metre, or 100 centimetres, by this distance. A patient with one *dioptre* of myopia has his far point placed one metre distant from his eye, and a patient with four dioptries has his at one quarter this distance, namely, 25 centimetres. If the far point is 20 cm. distant

from the eye, the calculation is $\frac{1 \text{ metre or } 100 \text{ cm.}}{20} = 5 \text{ dioptries}$

of myopia. The subjective method, however, should not usually be employed.

Rays which pass through a convex lens are refracted and undergo some convergence; those which pass through a concave lens undergo divergence. A convex lens placed before the eye, therefore, shortens the cone of rays, or advances the focus, whereas a concave lens lengthens the cone of rays, or causes the focus to recede. A convex lens is, for this reason, used in hypermetropia, and in the presbyopia of a normal eye when it is desired to obtain, without the use of accommodation, a sharp focus of rays which diverge from a near object. A concave lens is employed in myopia.

A hypermetropic person is able, by increasing the convexity of the lens in his eye, to obtain a clear view of a distant object provided that his power of accommodation is sufficiently great; this power decreases as his lens becomes more rigid with advancing years. Hypermetropia is often unrecognized by the patient, or latent, as long as he is able to neutralize the error by an accommodative effort; indeed, myopia may sometimes be simulated owing to excessive accommodation. A continued effort of this nature is likely to cause symptoms of eye-strain. Over-convergence may be associated with this exercise of accommodation.

Rays entering the eye are not always equally refracted in every meridian, but those which pass through one meridian may be more bent than those entering at right angles to it. In this case, the cone of rays will be compressed, so that its apex is not pointed, but is shaped like the extremity of a cold chisel or of a screw-driver; the retinal image of a point will in consequence be elongated (*Astigmatism*). A point of light appears pulled out in one direction, and a full moon appears oval to an astigmatic eye. (*N.B.*—The eye not under examination should be occluded.)

If a patient with astigmatism looks at a dial, on which lines radiating from a common centre are drawn, he will notice that the lines running in one direction appear more sharply defined than do the rest. This is because the retinal images of the points which compose the sharply defined line, are placed with their long axis in the same meridian; although each image is elongated, yet one

overlaps the other, so that a combination of the whole appears as a clearly focused line. In the case of the lines seen mistily, the elongated images are placed one beneath the other, with the long axis of each image at right angles to the meridian occupied by the whole line, these lines, therefore, appear wide and diffused.

Astigmatism is corrected by the use of a cylindrical lens.

An astigmatic person can often obtain good vision by using his accommodation whilst looking through half-closed lids. A low degree of astigmatism may be the cause of an obstinate hyperaemia of the lid margins.

Visual acuity is commonly estimated by the use of Snellen's test-types. These are so designed that each letter, when placed at the distance stated above the line to which it belongs, subtends at the eye an angle of 5'. The letter is contained within a square; this is divided into 25 smaller squares (5×5), and, at the appropriate distance, each of these subtends an angle of 1'. The smaller squares are used to build up the letter; the width of any stroke composing the letter is that of one such square, and any interval in a stroke is equal to one or more small squares.

Visual acuity is recorded as a fraction. The distance of the card from the patient is taken as the numerator, and the number which belongs to the line of the smallest letters read is taken as the denominator. Thus, the card is usually placed at a distance of 6 metres; if the patient can read no smaller letters than those normally seen at 18 metres his vision is recorded as $6/18$; if he distinguishes none smaller than those marked 8 metres his vision is $6/8$, and so on. Each eye must be examined separately, and the card must be placed in a good light and in the vertical position.

Since the normal, or emmetropic, eye, when at rest, is focused for parallel rays (its far point is at infinity), some alteration is required when a near object, such as small print, is looked at, and it becomes necessary to focus divergent rays. This *Accommodation* is effected by increasing the convexity of the lens through the action of the ciliary muscle. The *Near point* is that point from which come the most divergent rays that the eye is able to focus whilst exerting its maximal amount of accommodative effort. As age advances, the lens becomes more rigid, and accommodative power lessens; the near point, therefore, recedes from the eye. This diminution of accommodative power normally becomes apparent between the ages of 40 and 45 (*Presbyopia*), the patient notices that he requires to hold his book further from his face, but that a convex spherical lens of 1 dioptré enables him to read small type without undue strain at his normal reading distance. A hypermetrope experiences these symptoms at an earlier age, since his eye, when at rest, is adjusted for convergent rays, and a proportionately greater demand is, therefore, made upon his accommodative power. A myope of more than three dioptries, on the other hand, having his far point situated within 33 cm. from his eye, can read small type without accommodating; such a person is able to read print without glasses, even in old age, provided that his eye is otherwise healthy; he will,

however, require to wear glasses when he wishes to see distant objects clearly.

Correcting glasses for presbyopia can ordinarily be prescribed according to age; a convex lens of one dioptré is prescribed at 45, and another dioptré is added every five years up to the age of 55. Over-correction must be carefully avoided, since it is likely to cause a difficulty in convergence. Residents in the tropics usually need a proportionately stronger lens than do those in a temperate climate.

A subjective examination of the refraction and the sight may be made as follows: (1) Seat the patient at a distance of 20 ft. from a card of Snellen's test-types; (2) adjust on his face a trial frame, designed to hold two lenses before each eye; (3) place before each eye a lens of such strength as will over-correct the estimated amount of hypermetropia by two dioptries, or under-correct any supposed myopia by three dioptries; (4) ask the patient to look into the distance and to attempt to read the large type; (5) whilst he gazes at the letters, place a 0.5 D concave lens before those already in position and encourage him to read further; (6) remove the lenses last fixed and replace each by a 0.75 D; (7) continue to add concave lenses of gradually increasing strength until the best vision is obtained. (N.B.—The lens originally placed in the frame is left undisturbed throughout.)

When the acuity of vision has been brought to 6/18, the lens before one eye is replaced by a black disc, and the test is continued on the other eye alone. (Relaxation of accommodation is aided by the use of both eyes at first.) The highest convex lens, or the lowest concave lens, with which clear sight is obtained will signify approximately the degree of hypermetropia or myopia present. Ability to read part of the 6/6 line whilst mistaking some letters on the 6/12 and the 6/8 lines, is suggestive of astigmatism.

The lens originally laid in the posterior cell of the trial frame is next replaced by the appropriate spherical correction, in front of which is put a cylindrical lens. The axis of the cylinder is slowly turned through an arc of 180° until a position is found in which the sight improves. Stronger and weaker cylinders, with their axis in this position, are then tried in combination with stronger and weaker spheres until acute vision is attained.

The objective estimation is best made by RETINOSCOPY. Rays coming from an illuminated point on the retina emerge from the eye (1) parallel in emmetropia, (2) divergent in hypermetropia, and (3) convergent in myopia. The convergent rays in myopia intersect at the far point of the eye, i.e., at a point whose distance from the eye will, if measured, declare the degree of myopia. (If this point is at 1 metre there is 1 dioptré of myopia.) Parallel and divergent rays may be made to converge and to intersect 1 metre from the eye, if a convex lens of suitable strength is used. Convergent rays, which intersect within the distance of 1 metre, may be rendered less convergent, so that the point of intersection recedes to 1 metre, if a concave lens of suitable strength is used. A convex lens of 1 dioptré will be required in the case of parallel rays (emmetropia), and in that

of divergent rays (hypermetropia) a convex lens of 1 dioptré, plus another of sufficient strength to render the rays parallel, will be necessary; the latter lens will be the measure of the existing hypermetropia. The concave lens, required to cause the far point to recede to 1 metre, is not the full measure of the myopia, since an additional dioptré is necessary to make the rays parallel. When performing retinoscopy at a distance of 1 metre, therefore, 1 dioptré must be subtracted from a convex lens or added to a concave lens, in order to calculate the right correction from the lens used.

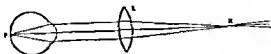


Fig. 12.—The course of the rays which emerge from an Emmetropic eye. The Emmetropic eye, when at rest, is in focus for parallel rays. Rays from an illuminated point on the retina, P, are parallel as they leave the eye. If a convex lens, L, of one dioptré (1D) is placed in front of the eye, the emergent rays will be focused at a distance of one metre, and will form a "point of reversal", R, at that point.

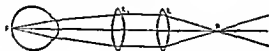


Fig. 13.—The course of the rays which emerge from a Hypermetropic eye. The Hypermetropic eye, when the accommodation is relaxed, is in focus for convergent rays. (N.B.—These do not occur in the absence of a refracting element.) Rays from an illuminated retinal point, P, therefore diverge as they leave the eye. These divergent rays can be rendered parallel by a convex lens whose strength equals the existing Hypermetropic, L₁; and they may be focused at a point of reversal, R, one metre distant from the eye, if a further one dioptré is added, L₂.



Fig. 14.—The course of the rays which emerge from a Myopic eye. The Myopic eye is in focus for divergent rays. Emergent rays therefore converge to a focus, or point of reversal, R, in front of the eye. (N.B.—This is the "far point" of the Myopic eye.) The number of dioptries of myopia present can be estimated by measuring the distance of R from the eye, and then dividing 100 cm (1 metre) by this distance expressed in centimetres. The point of reversal may be caused to approach to, or recede from, the eye, if suitable concave lenses are placed in front of the eye. The lens which fixes the point of reversal at one metre measures all the myopia present with the exception of one dioptré. It is necessary to add this further dioptré in order to render the rays parallel.

If the eye of the observer is closer to the examined eye than the point of intersection an erect image of the illuminated spot is seen; if it is further away an inverted image will be seen. A spot of light moving upon the retina will, therefore, appear to reverse the direction in which it travels on either side of the point of intersection (called the "far point" or "point of reversal").

The examiner usually employs a plane mirror to reflect light into the observed eye, and, seating himself one metre away, throws the light into the eye and slightly rotates the mirror. In this case the shadow, or edge of the illuminated area, appears to move in the same directions as the mirror, as long as the image is erect (whilst the observer's eye is closer than the point of reversal), but appears to move in the opposite direction to the mirror when the image is inverted (when the point of reversal lies between the observer and the eye under examination). In emmetropia, in hypermetropia, and in myopia of less than 1 dioptré, the "shadow" moves with a plane mirror; in myopia of more than 1 dioptré, it moves against the mirror. The opposite occurs if a concave mirror is used to reflect the light. Lenses are placed in front of the patient's eye until one is found which causes the point of reversal to lie at 1 metre, i.e., which induces one dioptré of myopia. 1 D is added to, or subtracted from, this in order to estimate the true refraction. During examination, it is essential that the patient should look directly at the light, and that his face and the correcting lens should lie in the vertical plane.

In astigmatism, the point of reversal does not lie at the same distance in every meridian. The meridian in which it is nearest, and that at right angles, in which it is furthest, are estimated; the difference between the two represents the amount of astigmatism.

It would be difficult to exaggerate the evil effect that errors of refraction may have on the health of the eye, and upon the general condition. A refraction error frequently entails a strain upon the ciliary muscle, and may lead to a disturbance of the balance between the ocular muscles—especially to over-convergence or under-convergence. Muscular strain causes hyperaemia, and so may render the conjunctiva and the lids unhealthy; and it may lead to disease of the deeper structures of the eye, should poisons be present in the system.

Headache is a common symptom; this may be ocular, frontal, temporal, or occipital; less frequently, it is felt on the top of the head. Occipital pain is often experienced, and the great occipital nerve may be acutely tender; sometimes, the pain runs to the nape of the neck, and may even reach the scapula. Giddiness, indigestion, and symptoms of "neurasthenia" may be caused. The patient is often unduly tired by his day's work and is disinclined to exert himself. All the symptoms are intensified by any gastro-intestinal disturbance which, in its turn, is aggravated by the eye-strain; a vicious circle is thus produced. It is important to remember that *a child at school, who needs a suitable pair of spectacles, may be unjustly accused of laziness and stupidity*. Eye-strain is most likely to be marked during periods of ill-health, of convalescence, or of pregnancy and lactation.

The following rough test of convergence efficiency may be employed in cases of headache of questionable ocular origin: Ask the patient to gaze steadily at the point of a pencil held six inches from his face; as he gazes, place a slip of paper in front of one eye.

If his convergent power is defective, the eye will be seen to swing outwards as it is occluded, but will resume its original position on being uncovered. An ocular cause for the pain may be strongly suspected, if this sign is present.

Every person who wears glasses should be most careful to ensure that the frames do not become bent, and that the lenses do not work loose and become displaced. Much eye-strain may be caused by a lens which is out of its true position, especially if the lens is a strong one.

TEST TYPES

No. 1	D. 0.50				} Reading Type
	FEET	LEFT	FEEL	TELL	
	COOL	LOOK	CONE	DOLE	
	DEPT	FLOW	LEFT	FIFT	
	CLOO	COLT	DOLA	COOT	
No. 2	D. 0.75				
	LEE	FEL	ELF	FOE	
	COD	7CD	COT	TOO	
	FEE	LET	EEL	ELL	
	ODG	COO	LOO	DOE	
No. 3	D. 1.00				
	FELL	TOLL	DELL		
	DOLE	FOOL	TOLD		
	FLED	LOLL	CELT		
	COLD	FOOD	DOFF		
No. 4	D. 2.00				
	TOE		OFT		
	DOD		ODE		
	LOT		FED		
No. 5	D. 6.00				} Distant Type
	L D T				
No. 6	D. 9.00				
	F B Z				

COLOUR-BLINDNESS

TEST 1

Give the candidate, in good daylight, a skein of pale but pure green; direct him to select, out of the bundle of wools, all those colours which appear to him to correspond to the test sample. If he does this correctly, it is unnecessary to proceed further, as the candidate has normal colour-sense. If, however, he selects one or several of "far" colours of confusion"—greys, buffs, straws—he is colour-blind.

TEST II

To ascertain the kind and degree of the defect, give a pink skein to be matched. If this be correctly done, the candidate is incompletely colour-blind.

If blue and violet, or one of them, be selected, he is red-blind.

If he selects green or grey, or one of them, he is green-blind.

In the absence of an Edridge-Green lantern, it is better to use coloured beads, as wools in India quickly soil and bleach.

FACIAL PARALYSIS

The common Bell's palsy is generally ascribed to a chill and is probably due to a mild inflammation of the periosteum or the nerve in the bony aqueduct of Fallopius, with consequent pressure atrophy.

TREATMENT.—Fomentations, mercury ointment, or a blister behind the ear and the administration of vitamin B, potassium iodide and salicylates are the accepted methods of treatment.

After a few days the galvanic current (positive pole over the mastoid) may be given. This has the great advantage of reassuring the patient and convincing him that something is being done.

The prognosis is almost uniformly good, recovery being usual after about six weeks.

Other causes of facial paralysis are syphilis (usually gradual onset), fractures of the skull, and otitis media or mastoid operation (history, also cannot taste salt, sweet or bitter things on anterior two-thirds of tongue because the lesion is above the part where the chorda tympani leaves the facial nerve). Facial paralysis sometimes occurs in leprosy and rarely in diphtheria.

LESIONS PRODUCING:

1. SUPRANUCLEAR:

(1) *Cortical:*

(a) Meningitis: (i) Acute; (ii) Tuberculous; (iii) Chronic.

(b) Meningeal haemorrhage.

(c) Cortical tumour.

(d) Depressed fracture.

(2) *Cerebral:*

(a) Cerebral haemorrhage.

(b) Cerebral embolism.

(c) Cerebral thrombosis.

(d) Cerebral tumour.

(e) Cerebral abscess.

(f) Cerebellar haemorrhage or pressure of forceps during birth.

2. NUCLEAR:

(1) Haemorrhage.

(2) Embolism.

(3) Thrombosis.

(4) Tumour.

(5) Syphilis—(a) Softening,

(b) Gumma.

3. INFRANUCLEAR:

(1) *At the Base of the Brain:*

(a) Syphilitic meningitis.

(b) Haemorrhage.

(c) Fracture.

(d) Tumour.

(2) *In the Petrous portion of the Temporal bone:*

(a) Otitis media.

(b) Haemorrhage into aqueduct of Fallopius.

- (c) Inflammation of the nerve.
- (d) Fracture.

FACIAL SPASM

In early cases change of air, massage and sedatives; later, if this fails, the affected branch should be injected with 3 to 4 drops of 90% alcohol which gives freedom for six months.

FAVUS

This is often complicated by pediculosis and sepsis, but the characteristic lesion is the "scutulum", a small yellow shield-like disc with a rather dull, friable hair growing through the middle of it.

Favus is caused by a mould, *Achorion*, and the skin has a mouse-like odour.

TREATMENT.—This is similar to that of ringworm, epilation being usually necessary for a cure. Crusts should be removed by soaking with oil for 24 hours followed by washing with soap and water.

In the absence of X-rays the writer has had success with the following method:

- (a) Remove crusts and wash hair.
- (b) Cut hair very short with clippers (which are at once put into boiling water for 10 minutes).
- (c) Apply Scott's dressing (Ung. Hydrarg. Co.) thickly on lint to the whole area, bandage, and leave for a week.
- (d) At the end of a week remove dressing and wash head with petrol or ether.

FEVERS OF UNKNOWN ORIGIN

The commonest cause of P.U.O. is one of the enteric fevers, the next is tubercle (often abdominal), the third is amoebic hepatitis or liver abscess, and the fourth pyelitis, and kala-azar is common in Eastern India. Malaria may be a cause, but not often, because it is generally thought of, looked for and treated first. It can be eliminated if four days' efficient anti-malarial treatment does not bring down the fever, and the blood is consistently negative. Several days' fever with vomiting often precedes jaundice. The writer has seen cerebrospinal fever diagnosed as fever of unknown origin, so always examines the occipital muscles for rigidity and the legs for Kernig's sign; the Pel-Ebstein fever of Hodgkin's disease is accompanied by enlarged glands, and otitis media and the "missed empyema" must be thought of in children. Hysteria can cause an unexplained temperature, but there must be very solid grounds for making the diagnosis; malingerers can display great ingenuity in faking their temperatures, and, finally, the thermometer may be at fault.

If quinine, chemotherapy, emetine, N.A.B. or antimony will not cure the fever, and a needle in the liver or chest will not explain it, it is probably typhoid, typhus or tubercle.

The excellent military routine examination is as follows and should be carried out whenever possible, especially blood culture about the 4th day.

LABORATORY METHODS FOR THE DIAGNOSIS OF FEVERS

Day of illness estimated from 1st day detained	Examinations to be carried out	Remarks
1st, 2nd, 3rd ..	Blood slide for malarial parasites.	Two slides each time; one thick, one thin. If case is serious, slides should be examined at 2-hourly intervals on the first day.
3rd, 4th, 7th ..	Blood culture ..	20 c.c. from a vein, distributed as follows: Into glucose broth or similar medium 5 c.c. Into gentian violet taurocholate medium 10 c.c. Into a test tube to obtain serum for Widal 5 c.c.
3rd, 7th, 11th, 15th, 19th, 23rd	Agglutination test: Enteric Group. Typhus Group Brucella Group	5 c.c. of blood in a test tube or 2 c.c. of serum in Wright's capsule. Agglutination for Brucella group need only be done when undulant fever is considered to be a possibility.
8th—12th .. 15th—19th .. 22nd—26th	Faecal culture ..	1 c.c. of fluid faeces should be sent to the laboratory in 10 c.c. of buffered glycerin-saline solution in a screw-capped bottle.
8th—12th .. 15th—19th .. 22nd—26th	Urinary culture . .	Clean penis, prepuce and glans with spirit, collect first morning urine preferably; discard first flow, and collect in sterile test tube. For women, a catheter specimen is required. For samples sent by post, add 1 c.c. of 1:10,000 brilliant green to each 20 c.c. urine.
1st, 5th ..	Chemical and microscopical examination of urine.	NOTE.—1. To arrive speedily at a correct diagnosis, the value of following this scheme for routine laboratory examinations cannot be over-emphasized.
3rd, 4th	Microscopical examination of faeces.	2. In the elucidation of obscure fevers, the following conditions should be kept in mind.—
3rd, 6th, 12th, 19th	Leucocyte count . .	(a) Malaria, Dengue, Sand-fly fever, Relapsing fever (b) The Enteric group of fevers, Infective Lepatitis (c) The Typhus group of fevers (d) Undulant fever (<i>B. melitensis</i> and <i>B. abortus</i>). (e) Tuberculosis (f) Septicaemias (Streptococcal, staphylococcal, <i>B. coli</i>). (g) Pyelitis, Liver abscess, Empyema. (h) Kala-Azar. (i) Lymphadenoma and certain new growths.

FIBROIDS OF THE UTERUS—See Gynaecology.

FIBROSITIS

Occurs wherever fibrous tissue is found, in the body ligaments, tendons, muscles, fasciae, aponeuroses and nerve sheaths, giving rise to peri-articular arthritis, tenosynovitis, lumbago, perineuritis, sciatica and brachial neuritis. It is the result of toxins in the blood-stream of two distinct kinds: infective or bacterial, and metabolic or chemical. Treatment resolves itself into the discovery of the cause and removal of the pain.

The common seats of focal sepsis are:

- | | |
|-----------------------------|-----------------------|
| (1) Teeth. | (6) Appendix. |
| (2) Tonsils. | (7) Gall-bladder. |
| (3) Nasopharynx. | (8) Intestinal tract. |
| (4) Nose and Nasal sinuses. | (9) Bronchial tract. |
| (5) Genito-urinary tract. | (10) Ears. |

METABOLIC CAUSES.—These are toxins of metabolism from faulty digestion, unsuitable articles of diet—sugar and starch in some people, protein and alcohol in others. Other causes are cold, damp, trauma and excessive exercise in sedentary persons.

TREATMENT OF ACUTE FIBROSITIS.—A good dose of calomel followed by a saline next morning. Complete rest in bed. Light diet. Analgesics such as:

R. Aspirin	..	gr. 4	or	R. Pyramidon	..	gr. 6
Phenacetin	..	gr. 4		Aspirin	..	gr. 6
Codeine	..	gr. $\frac{1}{2}$		Quinine Salicylate	..	gr. $1\frac{1}{2}$
Caffeine	..	gr. $\frac{1}{4}$		Codeine	..	gr. $\frac{1}{4}$

One cachet every four hours until the pain is relieved.

R. Sodium Salicylate	..	gr. 20-30	R. Pulv. Doveri	..	gr. 15
Sodium Citrate	..	gr. 20-30	At bedtime, if aspirin and salicylates	fail	
In a tumbler of hot water 4 times daily for two days.					

LOCAL.—Heat in the form of Antiphlogistine, mustard or linseed poultices, hot bottles, electrically heated pads, and radiant heat by hand lamp or bath. Oiatbermy is most effective, but the patient must be in bed.

If the painful area is moderately localized, inject 10-20 c.c. of $\frac{1}{2}\%$ Novocain every few days or 5 c.c. of Proctocaine, the analgesic effect of which lasts for about a fortnight. The local anaesthetic not only allows free movement to break down adhesions but causes a localized hyperaemia. Patients should be warned that the pain may be worse on the day after injection, but that it will improve afterwards.

TREATMENT OF CHRONIC FIBROSITIS.—This resolves itself into the removal of septic foci and vaccine therapy; the treatment of metabolic irregularities by less food, more exercise, the minimum of tea, coffee, tobacco and alcohol, and drinking plenty of water. In some cases a complete alteration of the diet to which the patient has been accustomed will work wonders. Radiant

heat, hot or mud baths or diathermy, followed at once by massage may be used. As regards drugs iodine in the form of Lugol's solution 5 to 10 m twice daily continued over several weeks probably gives the best results.

FILARIASIS

So far, no specific for this disease has been found, but improvement occurs under antimony treatment, either intravenously in the form of Urea Stibamine or tartar emetic, or intramuscularly in the form of Anthiomaline (M & B), Fantorin (Glaxo) or Stibinol (Brahmachari). Sulphonamides and penicillin have no effect on the filariae, but control secondary infections of oedematous parts. When severe oedema is present removal of the affected part may be considered, but swelling is liable to occur in other parts.

FINGER CRACKS

Avoid antiseptics, particularly methylated spirit; after drying the hands apply a little cream (the best is Eucerin, e.g., Nivea), wiping off the excess with a towel. Actual cracks should be covered with a small piece of Elastoplast. If there is any fungous infection, X-rays give the best results.

FISSURE AND FISTULA.—*See Anus.*

FLAT-FOOT

The foot which has never worn a shoe is normally flat in the resting position, but the arch appears when the powerful calf muscles come into play. So long as there is no pain or disability a flat-foot requires neither notice nor treatment.

If there is pain and the patient is young treatment is as follows.

EXERCISES.—For 10 minutes twice a day the patient points his toes inwards, the feet being bare, and alternately stands on tip toe and rolls his feet so that the weight of the body is taken by the outer side. When he walks he must never point the toes outwards. Foot-wear should have the heel tilted so that the inner side is $\frac{1}{3}$ rd inch higher than the outer; this not only throws the weight on the more stable outer side of the foot, but increases the arch, as the reader will see if he takes one of his feet in both hands and turns the heel outwards while holding the heads of the metatarsals flat. Arch supports are useful if they give comfort, they also help to throw the weight of the body on to the outer side of the foot. Acute flat-foot is associated with severe strain or gonorrhoea. If ligaments are torn, the foot should be put in plaster of Paris for three months.

FLATULENCE

This is of two kinds, (1) gastric, commonly due to swallowing air, and (2) intestinal, commonly due to carbohydrate dyspepsia, and perhaps to swallowing air as well. They are easily distinguished, because gastric wind comes up and intestinal wind goes down.

TREATMENT.—

Gastric Flatulence.—In the absence of organic disease (shown by the chronic foul odour of the gas) the patient should be told that all the wind he brings up is swallowed. If there is acid dyspepsia, which the patient instinctively tries to relieve by swallowing alkaline saliva, an alkaline mixture or Aludrox should be given. If the patient says he (or she, often at the menopause) "never stops belching", explain that about 90% of the belches are efforts in the wrong direction. Tell the patient to put a piece of wood firmly between his front teeth next time he has an attack; this makes it difficult to swallow wind, but not to bring it up, and he may be surprised to find that instead of bringing up wind he was really swallowing it. Once this is realized no further treatment is necessary.

Favourite prescriptions for gastric flatulence are as follows:

R. Sod Bicarb	gr. 20	R. Menthol	gr. $\frac{1}{4}$
Spirit Chlorof. . .	℥ 15	Spirit. Vini Rect.	℥ 30
Tinct. Card. Co. . .	3j	Spirit. Ammon. Aromat.	℥ 30
Aq. Menth. Pip. ad . .	3j	Tinct. Zingiberis	℥ 30
		Aq. ad	3j

Two drops of one of the essential oils, such as peppermint, cloves, aniseed or caraway, on a lump of sugar also help to bring up the wind, and animal charcoal has a great reputation as an adsorbent.

Bicarbonate of soda is a good carminative, because by generating carbon dioxide it increases the pressure in the stomach to that level at which the patient can indulge in a loud and pleasurable belch.

Flatulence in the elderly should raise suspicion of heart disease, especially coronary sclerosis.

Intestinal Flatulence.—First inquire about the duration and make a careful examination, including if necessary a barium meal, to make certain that there is no organic obstruction. If this is present, surgical treatment will be required, but if not, the most likely cause is carbohydrate dyspepsia, so the first thing to do is to eliminate carbohydrates from the diet as far as is possible and to give some artificial ferment, of which Taka Diastase is the best. Animal charcoal is of value in the treatment of flatulence as it adsorbs gases and checks fermentation. The repeated passage of flatus often means that a motion should be passed, so a visit to the lavatory is required. An accumulation of flatus can be got rid of by a smart purge or a turpentine enema, especially if preceded by a dose of eserine gr. $\frac{1}{8}$ and Pilocarpin 1 c.c. Early morning flatulence of recent origin may be due to sprue.

FOOD POISONING (*See also Botulism.*)

This may be due to a variety of causes, thus the animal or plant composing the food may be poisonous, as in the case of certain tropical fish, mushrooms and ergot. The food may be poisoned by chemical substances such as lead, arsenic, copper, etc.; this may be result of accident as with lead from pipes, impurities such as arsenic in sweets and beer, etc., and copper in erosion of cooking pots. These types are, however, small in number compared with outbreaks

due to infection of food with pathogenic bacteria, of which three-quarters of all outbreaks belong to the *Salmonella* group of bacteria. The infection may occur in almost any kind of food such as canned foods, milk and milk products, meats, fruit and vegetables; in the great majority of cases, however, it occurs in foods which have been handled and made up. It must be emphasized here that such a thing as ptomaine poisoning does not exist; the advanced decomposition of food necessary to produce ptomaines would make the food too unpleasant to eat, while food poisoned with *Salmonella* bacilli is normal to taste, smell and look. The symptoms are violent vomiting, diarrhoea and abdominal pain, with cramps and collapse. In the more severe cases the mortality is under 2%.

TREATMENT.—Complete rest in bed, with hot applications to the abdomen. Stop all food and liquids; if there is much pain without collapse give a hypodermic injection of morphia. In a case of moderate severity give a dose of castor oil in the following form:

R. Oleum Ricini	..	..	..	..	℥vj
Sp. Vini Gallici	..	..	..	..	℥ij
Tr. Opi	..	..	..	..	℥ 10
Aqua Cinnam. ad	..	..	..	..	℥iss

Followed by:

R. Bismuth Carb	..	..	..	..	gr 20
Liq. Morph. Hyd.	..	..	..	..	℥ 10
Pulv. Acaciae	..	..	..	..	gr. 8
Aqua. Chloroformi ad	..	..	..	..	℥j

Every four hours

Eight tablets of sulphaguandine, followed by four tablets four-hourly, are probably the best treatment; if there is much dehydration give intravenous hypertonic saline (see Cholera). The patient must be kept warm, and heart stimulants such as Coramine may be needed.

When feeding is recommenced give at first sips of water, then albumin water, whey, chicken or veal broth 3 or 4 oz. every 2 hours, to which brandy may be added. Then citrated, peptonized and ordinary milk, and so to the ordinary diet.

FOREIGN BODIES IN AIR PASSAGES AND OESOPHAGUS—

See Air Passages and Oesophagus—Foreign bodies in.

FRACTURES

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The treatment of fractures, both in India and elsewhere, is unnecessarily bad and it is hoped that these short notes, which deal only with the commoner fractures and are written for those who do not have access to X-rays as well as for those who have, may be of some assistance.

The best book on fractures so far written in any language is *Fractures and Joint Injuries*, by Watson-Jones, to whom the whole world (including the writer) owes a debt of deep gratitude.

GENERAL PRINCIPLES.—

- (a) A fracture should be treated as an emergency; the sooner it is reduced the easier and more accurate is the reduction, but shock must be treated first.
- (b) Before a fracture can be reduced, spasm of the muscles must be overcome. There are three principal methods.
 - (i) *Injection of absolutely sterile local anaesthetic between the fragments*—this not only helps reduction but is merciful to the patient and should be used when any but the shortest manipulations are required.
 - (ii) *Traction*—this is generally combined with a local anaesthetic. For the upper limb, manual traction is sufficient, but for the lower limb, mechanical aid may be required.
 - (iii) *A general anaesthetic*—the intravenous barbiturates (Cyclonal Sodium, Pentothal Sodium and Evipan Sodium) are excellent for adults, and chloroform or ethyl chloride on an open mask are best for children.
- (c) Never operate during shock is an old motto which is doubly true; the combination of an anaesthetic (especially chloroform or spinal) and painful manipulations being an ideal method of "bumping off" an otherwise savable patient. If shock is present, therefore, it is treated first, the only surgical manipulations permissible being those necessary to make the patient comfortable.
- (d) Closed reduction of a fracture is almost impossible more than a week after the injury.

- (e) In fractures of the upper limb the immediate necessity is to encourage thumb and finger movements, and in the lower limb to preserve the power of the quadriceps. These are therefore actively exercised hourly during the day from the very beginning, and plastering is contrived so as not to interfere with their movements.
- (f) Fractures involving joints must be reduced as accurately as possible, otherwise arthritis will follow in later life.
- (g) NON-UNION.—The cause of this is non-immobilization associated with poor blood supply, and any bone will unite if it is immobilized for long enough. Non-union must be especially guarded against when a fracture cuts off the blood supply to one fragment, as in the lower third of the tibia or ulna, the head of the femur or the proximal piece of the carpal scaphoid where absolute immobilization may be required for months.
- (h) Early massage and passive movements are the surest means of producing stiff joints. Nature is greater than misapplied Art, and every effort is now made to make the patient use his own muscles and move his own joints so long as this does not disturb the fracture.

VOLKMANN'S ISCHAEMIC CONTRACTURE.—

The cause of this is obstruction of the main artery of the limb, the commonest lesion being a supracondylar fracture of the elbow, in which the brachial artery gets caught between the flexed forearm bones and the sharp edge of the upper fragment. Sometimes the mere scratching or wounding of the artery is enough to make it go into obstinate spasms with resulting ischaemia.

Prophylaxis and treatment.—The condition is thought of and guarded against in all injuries of the elbow, so:

- (i) Dislocations and fractures are reduced at the earliest possible moment.
- (ii) Damaged elbows are never put up so flexed as to obstruct the circulation.
- (iii) The radial or ulnar pulse is carefully watched. If this is found to be absent the plaster is removed and the elbow straightened as much as may be necessary to restore the pulse. Amyl nitrite vapour may be administered as this has a direct action on the muscular coat of the arteries. If the condition persists, Watson-Jones recommends brachial plexus block anaesthesia, which may "do the trick" or may have to be followed by dissection of the artery in the affected area. If the artery is gently freed from its surroundings and sterile hot packs applied it generally starts beating. If it is found to be badly damaged it should be ligatured above and below the injury.
- (i) X-RAYS.—Good fracture work is impossible without X-rays and it is greatly hoped that in the near future every

electrically equipped hospital and dispensary in India will have a portable X-ray machine, which, before Hitler chose to make life cheap and everything else dear, complete with instructions cost about Rs. 3,500 in Bombay; a good clinician is, however, better than a bad radiographer. No surgeon should habitually reduce fractures under the X-ray screen, because repeated exposures cause burns, anaemia and death.

- (j) **SPLINTS.**—The only splint commonly used nowadays is Thomas's splint for fractures of the thigh. All other fractures are treated in plaster of Paris.

PLASTER OF PARIS.—If this is applied within the first few hours, before reactionary traumatic swelling has set in, the greatest care must be taken to see that subsequent swelling does not obstruct the circulation; the chief precautions taken are.

- (i) To wrap a flannel bandage or a thin layer of cotton-wool round the limb at the seat of the fracture.
- (ii) Never to apply the encircling bandage tightly, and
- (iii) Always to keep the limb elevated for the first 48 hours.

The complaint that a bandage or plaster is too tight must not be neglected by day or by night.

The slab method is the best and consists of applying a slab of several layers of wet plaster bandage to the surface of the limb; in other words, an accurately fitting splint is manufactured and fitted on the spot.

The required length of the slab or slabs is first estimated. A dry plaster-of-Paris bandage is then unrolled on a flat table to the required length, backwards and forwards until it is about 8 layers thick for the upper limb and 12 or more for the lower. Several rolled plaster bandages are also put ready.

The slabs are now wetted by being passed through water and applied direct to the limb, which is held in correct position by an assistant. Two slabs are generally applied, one to the anterior and one to the posterior surface; they are bound on with lightly (*not* tightly) applied wet plaster bandages, plaster cream or a little dry plaster and water being rubbed gently into them to form a smooth, homogeneous mould. If much reactionary swelling is anticipated, the slabs are fixed with ordinary soft bandage, which is later replaced by plaster bandage. Plaster is crisp enough to hold the limb in position after five or ten minutes, but is not hard enough to stand real strain till next day. The setting time can be lengthened by adding borax to the water, 1% making it about 8 minutes, 1½% 15 minutes, and 2% half an hour.

Plaster must be of the best quality and must be kept absolutely dry till it is used. Cellona or Gypsona plaster bandages are excellent from every point of view and are supplied in air-tight tins. They cost more than ordinary loose plaster and wide-mesh bandages, but are worth it for those who can afford them.

Glass plastic bandages after immersion in special setting fluid form a light, firm cast which will probably replace plaster in many cases.

Wedging a plaster.—If, after a limb has been put up and the plaster has set, the fragments are found to be at an angle, the plaster is cut round three-quarters of its circumference, opened out and wedged as shown, the wedge being replaced by a fresh plaster bandage.

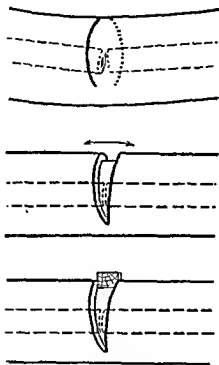


Fig 15.—Wedging a plaster.

Care must be taken not to form ridges in the plaster as these will cause sores.

Patients in India may suffer agonies from bugs, ants or other "livestock" beneath their plaster. The best safeguard is a clean patient, a clean bed and clean bed-clothes. The feet of the bed may also stand in small tins of Phenyle. The limb may be lightly powdered with D.D.T. or a similar preparation before the plaster is applied.

"Walking plaster".—This lets the patient get about soon and therefore quickly restores his self-confidence and perhaps his income; while immobilizing the fracture it allows the neighbouring joints and muscles to perform their natural functions, which is the best thing they can do, and is far better than massage, passive movements or Faradism. The surgeon must, however, make quite sure, particularly in the lower third of the tibia—where the least movement may mean non-union—that the walking plaster will not interfere

with the fixation or position of the fragments. The plaster must fit perfectly and X-ray pictures must be taken at frequent intervals. The permanent result must never be endangered for a temporary benefit. The iron caliper, which theoretically transferred the weight of the body to above the fracture, has been largely abandoned, a wooden, felt or rubber heel serving instead. It is important for the plaster slab to be specially reinforced to take the weight. The heel can be attached by adhesive plaster or by any other method which the ingenuity of the surgeon discovers.

SKELETAL TRACTION.—This is rather going out of fashion but is often useful in the lower limb. It should never be used in the absence of good nursing and X-ray facilities. External skeletal fixation, in which both fragments are controlled by wires or pins connected to an external adjustable bridge, is being increasingly used in America by Roger Anderson and others. It is a method for the specialist, whose good results are due as much to his own skill and care as to the virtue of the apparatus.

BONE-PLATING AND GRAFTING.—With the advent of vitallium plates and screws, which cause no local reaction, these methods are coming back into favour. Again, they are for the specialist, in whose hands they give excellent results where fractures cannot be satisfactorily treated by manipulation. Bone grafts are used to bridge gaps or to help union, the autogenous graft being commonly employed. Oblique fractures of long bones, especially the tibia, are being increasingly treated by the insertion of a single vitallium or stainless-steel screw to hold the fragments together, but plaster of Paris must be applied and every care taken just as if the screw were not there, otherwise there will be disaster as the screw merely holds the fragments in position and gives only negligible lateral stability.

AVASCULAR NECROSIS.—As already pointed out, a fracture may cut off the blood supply of one of the fragments. When this affects a small fragment, like the head of the femur or the proximal part of the carpal scaphoid, it dies, the process being called avascular necrosis. A similar condition may follow certain fracture-dislocations in which the blood supply coming from tendons or ligaments is torn off, the posterior fragment of the astragalus and, occasionally, the head or the outer condyle of the humerus being liable to this affection. Finally, in the case of a small bone, such as the semilunar, a simple dislocation, by tearing away the blood-supplying ligaments, may be the cause. Injuries such as those mentioned are, therefore, regarded with suspicion and treated with respect.

Diagnosis is made by X-ray examination and is easy; because there is no circulating blood to carry away the calcium, the affected fragment cannot share in the disuse decalcification which affects the neighbouring bones; so X-ray pictures taken during the second month after the injury show a *relative density* of the affected fragment. If this is present, bony union will be delayed until the dead fragment, as in the case of a bone graft, has been absorbed and replaced by living bone, a process taking months or even years.

So-called Perthes's disease of the head of the femur, Osgood-Schlatter's disease of the tubercle of the tibia, Kohler's disease of the tarsal scaphoid, Calvé's disease of the vertebrae and Kienbock's disease of the semilunar bone are all examples of the same condition and are due to some perhaps unsuspected injury which has interfered with the blood supply or caused local thrombosis.

Nursing.—A bed-ridden patient has to be nursed, washed, fed and given the bed-pan; splintage therefore has to be arranged so that these necessary functions can be carried out without hurting the patient or disturbing the fracture; a careful surgeon will watch the performance of these necessities from time to time and thereby gain much wisdom.

SOME COMMON FRACTURES.—

CLAVICLE.—Usually caused by a fall on the point of the shoulder, occasionally by direct violence, and usually at about the junction of middle and outer thirds.

Diagnosis.—The patient complains of pain and usually supports the affected elbow with the other hand. The injured shoulder is lower than the other because the broken clavicle no longer supports the weight of the arm. The pectoral muscles also draw the shoulder inwards and forwards. The sharp edge of the inner fragment is generally palpable and always tender.

Treatment.—The object is to preserve a perfectly functioning shoulder, arm and hand. For this reason strapping the arm and hand to the side is now completely abandoned as it invariably resulted in a stiff and crippled hand.

Method.—Standing behind the patient, who sits on a stool, the surgeon places his knee between the patient's shoulder blades and using his knee as a fulcrum draws the patient's shoulders backwards and slightly upwards. A four-inch (three-inch for children) strip of fresh Elastoplast is then applied, stretched fairly tightly, so as to keep the shoulders well back; the Elastoplast begins at the fracture, passes round the affected shoulder, across the back, round the other shoulder, and ends at the junction of the outer and middle thirds of the other clavicle; a second piece of Elastoplast forms a supporting U beneath the elbow of the affected side and passes over the inner fragment of the broken clavicle, which the weight of the arm thus helps to bring downwards. Two, or even three, layers of Elastoplast are thus applied. The forearm is supported by a sling.

Another method is to pass a soft figure-of-eight roller bandage under both shoulders, a pad of cotton-wool protecting each axilla and the weight of the elbow being taken by a sling.

After-treatment.—Active movements of the affected arm are carried out daily, and the hand is exercised and used normally for writing, etc.

It is very difficult to keep a fractured clavicle in perfect position (and it does not matter very much if you don't); if this is necessary for cosmetic reasons the patient may lie on her back, with a sandbag between the shoulders, for about a fortnight. An excellent splint—

the Roger Anderson clavicle splint, costing about Rs. 100—has recently been introduced in America by the Tower Company of 1008 Westero Avenue, Seattle; it has the advantage of being applicable to either side, and attachments can also be provided for treating arm fractures.

COLLES'S FRACTURE.—

Cause and diagnosis.—Nearly always the result of a fall on the outstretched hand, the typical dinner-fork deformity being caused by the displacement of the lower fragment backwards, combined with a backward tilting and displacement towards the radial side; the resemblance to a fork is increased by the fact that the fingers are held in a position of slight flexion.

Treatment.—Early and correct reduction will restore the hand and consequently the patient's usefulness to normal; late or wrong treatment will cause lifelong disability. X-rays are not necessary for diagnosis or reduction *but are desirable after reduction* to confirm that this is good; X-rays are further desirable because there are two varieties of Colles's fracture—one in which there is a plain fracture across the radius; this is easy to reduce and the prognosis is excellent. In the other variety there is some comminution and the fracture involves the joint surface, making accurate reduction more difficult and the chance of arthritis in later life greater.

Method.—

- (a) The distal fragment is disengaged by shaking hands with the patient, adducting the hand gently but firmly to the ulnar side and exerting traction at the same time.
- (b) The operator presses his thenar eminence against the palmar surface of the upper fragment (right hand for right wrist and left hand for left wrist) and with the thenar eminence of the other hand powerfully flexes the lower fragment.
- (c) When the antero-posterior deformity has been reduced the surgeon executes an exactly similar manoeuvre on the sides of the wrist, pressing the lower fragment firmly towards the ulna. If both these manoeuvres are correctly carried out the lower fragment will be in perfect position. Local or intravenous anaesthesia will usually be required.

Application of plaster.—With the assistant holding the wrist in the corrected position, the surgeon applies a plaster slab which includes the first metacarpal, but not the palm of the hand; the wrist should be straight or very slightly dorsiflexed (if the fragments are well and truly reduced, the danger of displacement is slight); the hand should *never* be put up in the flexed position. A plaster bandage is now applied to fix the slab and great care is taken to mould it firmly and closely round the lower fragment.

After-treatment.—The hand is elevated to reduce swelling, but if this is great and there seems to be danger of circulatory obstruction the plaster may be slit up on the palmar aspect and an ordinary

bandage applied over it. The finger and thumb must be exercised, the best exercise being for the patient to use them as though nothing had happened; they must also be fully flexed and extended many times each day. Neglect of these precautions may result in lifelong disability, so it is worth taking trouble over them. After a few days the swelling subsides and the plaster works loose, so it is replaced.

FRACTURE OF THE SHAFT OF THE RADIUS.—

Diagnosis.—Tenderness and crepitus are present at the site of the fracture, which is often caused by direct violence. The subcutaneous ulna is felt to be entire. If there is marked angulation of the fragments, a dislocation of one or other radio-ulnar joint is also present (Watson-Jones).

Treatment.—This depends upon whether the fracture is in the upper or in the lower half. In the upper half, the fracture is above the insertion of the pronator radii teres, so the biceps and supinator brevis keep the proximal fragment in full supination; consequently, in order to effect and maintain reduction, the part below the fracture must be put and maintained in the same position. In a fracture below the insertion of the pronator radii teres this muscle antagonizes the biceps and supinator brevis so the proximal fragment lies half-way between supination and pronation; if treatment is to be successful the lower fragment must do the same.

There is always a tendency for the broken radius to bend towards the ulna and this is very difficult to counteract. Bohler and others teach that pressure with a piece of cork or wood between the bones will separate them, but in actual fact the mass of muscle covering the radius makes this difficult. Before the plaster sets, it should be firmly flattened by pressure on the palmar aspect between the bones. After two or three days the plaster should be replaced if it is loose after the swelling has subsided.

In order to prevent shearing and consequent non-union, all twisting movements between the fragments must be prevented. This is accomplished by including the wrist and elbow joints in the cast.

A slab is laid along each aspect of the forearm from just above the metacarpal heads to the middle of the upper arm. The wrist is, of course, put up in the dorsiflexed position and the elbow flexed to a right angle. The cast must on no account interfere with the free movement of the thumbs and fingers.

After-treatment.—The plaster is not removed permanently until firm union has taken place; this usually takes about eight weeks, but if any rotation movement has been taking place it will be much longer.

FRACTURE OF BOTH BONES OF THE FOREARM.—This is a very common fracture and can cause much disability.

Diagnosis.—This is made by the deformity and abnormal mobility.

Treatment.—The object is perfect alignment of both bones without torsion or without interference with finger and hand movements.

Method.—In children, a general anaesthetic is required; in adults local or intravenous anaesthesia.

Before successful manipulation can be carried out, all over-riding of the fragments must be overcome. This is done as follows:

The patient's elbow is flexed and a bandage passed round the arm just above the elbow and secured to some firm object behind, or, if an anaesthetic has been given, beneath the patient.

The assistant now takes the patient's hand in both of his own and exerts strong and steady traction, pulling against the bandage; traction may have to be kept up for five minutes before the fragments are freed. Remembering the point already emphasized about supinating the forearm for fractures above the pronator teres and holding it in mid-position for fractures below, the surgeon now manipulates the fragments of the ulna (which being subcutaneous can be felt) into a good clinical position.

By manipulation and digital pressure between the bones, so as to separate the radius from the ulna, the former is also manipulated as well as its thick covering of muscles will allow; reduction of the radius can often be helped by bending the forearm slightly to the ulnar side. When the surgeon is satisfied that the bones are in as good a position as he can get them, he applies a plaster slab back and front, the part on the back of the forearm passing between the layers of the holding bandage, on which strong traction is being kept up. The slabs should extend from just below the shoulder to just above the metacarpal heads, the wrist being in dorsiflexion and the fingers allowed free movement. The slabs are fixed with plaster bandages, and the assistant keeps up traction till the plaster has set. The ends of the traction bandage are now cut short and covered with a plaster bandage. If the fractures are so high up in the forearm that flexion of the elbow causes flexion at the site of fracture, it should be put up with the elbow straight or flexed so slightly as not to interfere with the alignment of the fragments.

If good alignment cannot be obtained, operation may be considered, but this should be done only by a surgeon who specializes successfully in orthopaedics. A bad operation produces a worse result than no operation.

FRACTURE OF THE SHAFT OF THE ULNA.—If there is no angulation, the fragments are digitally manipulated into good position and the case treated as just described for fracture of both bones.

If there is angulation of the fragments, dislocation of the head of the radius is present and trouble may be expected; if possible, the patient should be admitted to the orthopaedic ward of a General Hospital, otherwise treatment on the following lines will produce the best results. When, as generally happens, the head of the radius is dislocated forwards and the fragments bent in the same direction, strong traction is made with the elbow flexed, the head of the radius is pressed backwards and the plaster applied as in a fracture of both bones already described. In the rare event of a backward

dislocation and fracture, strong traction is exerted on the extended forearm and the fracture is put up in this position.

FRACTURE OF THE CARPUS—The only common fracture is that of the waist of the scaphoid, which should always be suspected if a "sprained wrist" causes prolonged pain at the radial side of the wrist. Accurate diagnosis is possible only with X-rays, which may not show the lesion until some weeks have elapsed. The great point of interest is the liability to non-union, for which there are two reasons; the fracture is in line with the mid-carpal joint, so movement between the fragments occurs with every movement of the wrist (the moral of this is obvious—complete immobilization), and in addition, the blood supply is often so arranged that the fracture cuts it off from the proximal fragment.

Treatment.—The wrist is dorsiflexed and a plaster applied which includes the forearm and the metacarpals, but does not interfere with movements of the fingers; the metacarpal of the thumb must be firmly immobilized, but the thumb itself is allowed free movement. The plaster may have to be kept on for many months before X-rays show firm union, after which it may be discarded, but not before. In long-standing cases with no prospect of union the proximal fragment may be excised.

FRACTURES OF THE HUMERUS.—Fractures of the *upper end* may be caused by direct violence such as a blow with a lathi, when the greater tuberosity is cracked or comminuted, with or without injury to the head or neck of the bone, the damage being proportional to the violence of the cause. Displacement is rare, so the fracture need not be immobilized.

Fracture of the *surgical neck* is generally caused by a fall on the hand or elbow, and is nearly always impacted. In elderly people it should not be disimpacted, because the subsequent immobilization causes more disability than slightly faulty union. In younger patients disimpaction is probably required because the lower fragment is always adducted or abducted on the upper fragment. Disimpaction and reduction must be done under X-ray control, otherwise more harm than good will result. Traction is applied, the fragments are manipulated into position and the arm is put up in plaster in the position in which the fragments remain secure, generally slight abduction. The fingers are, of course, constantly exercised and used.

In *fractures of the shaft* the position of the upper fragment varies with the site of the fracture; above the powerful pectoral and latissimus dorsi muscles it is drawn upwards and generally abducted, whereas below them adduction occurs, unless the fracture is below the insertion of the deltoid, when it is in the neutral position. Marked rotation does not occur.

Oblique fractures, i.e., those caused by indirect violence, heal well, but with transverse fractures there is sometimes delayed union, so this must be watched for, and if there is any sign of it the joint above and the joint below must be immobilized, perhaps for many

weeks or months; this is achieved by a plaster bandage which includes the chest wall, the abducted shoulder and the flexed elbow.

For most fractures of the shaft of the humerus, a U-shaped slab passing under the bent elbow, reaching up to the shoulder and bound on with a plaster bandage, suffices; the wrist is supported by a sling and the weight of the arm provides adequate traction. As is well known, the musculospiral (radial) nerve may be damaged as shown by wrist drop. Paralysed muscles must not be stretched if they are to recover, so the hand is put up in supination and full dorsiflexion by means of a palmar slab which goes just beyond the heads of the metacarpals and keeps the thumb abducted. If there are no signs of improvement after six weeks, the nerve must be cut down on and appropriate operative treatment carried out. As this nerve heals better than any other nerve in the body, the prognosis is good.

SUPRACONDYLAR FRACTURE OF THE HUMERUS.—

This is caused by a fall on the outstretched hand and is commoner in young people, older people generally suffering a posterior dislocation of the elbow. The lower fragment is driven backwards, where it is held by the sling-like action of the triceps. It is distinguished from dislocation of the elbow by the presence of crepitus, and of the olecranon between the condyles; furthermore, re-displacement easily occurs after reduction.

Treatment.—This is a matter of urgency, partly to relieve pain, and partly to prevent damage to the brachial artery by the sharp lower edge of the upper fragment with consequent ischaemic contracture. The amount of swelling may be very great, obscuring the parts and making the following manipulations much more difficult than they sound.

A general anaesthetic is given and when relaxation is complete, the surgeon pronates the patient's forearm. Using the right hand for the right side and vice versa, the surgeon takes the patient's wrist in one hand and the slightly flexed elbow in the other; with both hands he now exerts firm but gentle traction; keeping this up the whole time, he uses his upper hand to press the fragment forward; when he feels this occur, and still keeping up traction, he gently bends the patient's elbow to about 60 degrees. If there is any obstruction whatever, the bending must be stopped at once, further traction applied and then another trial made, otherwise the brachial artery may be nipped between the fragments. The pulse (which may have been absent before reduction) is now felt for, and if it is beating satisfactorily plastering is proceeded with.

In these cases the general rule against manipulation under the X-ray screen should be broken and the arm is gently flexed or extended until the fragment is seen to be in perfect position. A posterior slab is now applied from the wrist (the forearm being pronated) round the bend of the elbow to below the shoulder. The slab should encircle about two-thirds of the arm, and is fixed with

soft bandages; a layer of cotton-wool is put over the front of the elbow and the upper arm to prevent pressure on the arteries.

Two things must now be ascertained:

- (a) That the radial pulse is beating (if not, see under Volkmann's Ischaemic Contracture).
- (b) That the fragment is in good position as shown on an X-ray film; if not, the plaster must be removed and re-applied. The arm is kept raised on a pillow while the patient is in bed.

Later when all swelling has subsided the arm may be put in a plaster cast.

Occasionally, from a fall on the elbow, the opposite to this fracture occurs, the lower fragment going forwards; in this case the arm is fully extended at the time of reduction and is put up in plaster in the straight position.

FRACTURES OF THE FINGERS.—These commonly affect the proximal phalanx and the displacement is always the same—forward angulation—the proximal fragment being flexed and the distal one extended. The finger is therefore put up in flexion with a plaster gutter along the dorsum and traction exerted on the distal phalanx either by a wire passed through the pulp or by adhesive plaster. If the reader holds up his hand to the light and slowly bends all four fingers at once while keeping the tips together he will notice something; daylight appears between the proximal phalanges, because the tips of the fingers point towards the centre of the palm; fractured fingers, therefore, are put up in this position.

FRACTURE OF THE LOWER LIMB.—

THE NECK OF THE FEMUR.—This fracture is especially common in old people and may follow a seemingly inadequate cause. In younger people it is commonly the result of a fall from a height or other severe injuries.

Diagnosis.—Diagnosis without X-ray examination is not always easy, especially in impacted cases, but the common physical sign is eversion of one foot; shortening is present except in impacted cases, and the great trochanter lies above Nelaton's line from the anterior superior spine to the tuber ischii.

Types.—Although not strictly anatomical the old division into intracapsular and extracapsular is sound, because in the former the blood supply to the head is precarious, so avascular necrosis (see above) may occur.

Intracapsular fracture.—This is commonly divided into *Adduction* (80%) and *Abduction Fracture* (20%). The relative frequency is unfortunate because abduction fractures are always impacted and always join up if not disimpacted by accident or a too zealous attendant; further, the fracture line is horizontal, so weight bearing tends to impact the fragments. If, therefore, fracture is suspected, if there is evidence of abduction of the lower fragment and if the trochanter is on or below Nelaton's

line, no action must be taken that might disimpact the fragments. The condition is confirmed by careful X-ray examination and relatively no treatment is needed, but weight bearing must not be permitted until union is sound—a matter of three months or so.

Abduction fracture.—This is the common fracture of the neck of the femur in old people and is serious for several reasons, one of which is that the prolonged recumbency formerly inflicted on the patient often caused pneumonia and death. However, better a live dog than a dead lion, so if it is a question of saving a patient's life or saving his femur, the former is usually chosen. Another trouble is the difficulty of approximating the fragments and yet another the chance of delayed or non-union. Reduction is accomplished by Whitman's method. It will be remembered that the displacement consists of shortening, adduction and external rotation. Whitman's method is to reverse each of these deformities. Under a general or spinal anaesthetic (but only if the patient's condition permits) strong traction is applied to the limb until shortening has been overcome, it is then abducted so as to approximate the neck of the bone to the separated head and finally the limb is internally rotated until the inner edge of the foot is a few degrees to the mesial side of the vertical. It was Whitman's practice then to put the limb up in this position, the plaster being a large spica extending from the chest to the toes, and he got good results. A later modification, which helps both reduction and the subsequent health of elderly patients, is to flex the hip in addition to applying traction and abducting and internally rotating it, the patient can thus be nursed in the sitting position and is less liable to pneumonia. The plaster is kept on (renewed when necessary) until union has occurred—at least three months.

Nowadays, the method of reduction is the same, but in modern clinics the Smith-Petersen nail has completely superseded the Whitman plaster, although the latter has its uses away from the specialists, which is why it is described in some detail here.

Those who wish to use the Smith-Petersen nail should consult Watson-Jones's book, but briefly, the nail is a three-flanged stainless steel or vitalium affair with a cylindrical hole down the centre. It is introduced along a guide wire already inserted through a small hole cut in the cortex of the bone half an inch below the great trochanter. Before the nail is inserted the position of the guide wire must be carefully checked up by X-ray pictures taken at right angles to each other so as to make sure that it runs exactly through the middle of the neck and head of the femur and stops short of the articular cartilage of the head.

The after-treatment is simple, no plaster is required, but no weight bearing is permitted until sound union is established;

if avascular necrosis has occurred (as it generally did in the old "open" method) union may take as long as two years, but in the average case two or three months are sufficient. The insertion of the nail is a task for the specialist with his special equipment, but it is such a great advance on all other forms of treatment that every effort should be made to give the patient the benefit of it, especially as the subsequent treatment is simple and can be carried out at home. The nail can be removed when union is completely consolidated, or can be left in place—as the modern non-ionizable metals cause no irritation. Self-extrusion of the nail is prevented by a small fixing pin at right angles to it.

FRACTURE OF THE SHAFT OF THE FEMUR.—This is commonly the result of direct violence, e.g., a motor-car wheel, in which case the fracture is transverse or comminuted. The position of the limb, the angulation, the shortening and the inability to bear weight are all characteristic of the lesion.

Treatment.—Strong traction under local anaesthesia is needed and it may be said here that in a transverse fracture the result will be good if the broken surfaces can be apposed (even though the apposition is imperfect) so long as the limb is kept in alignment. This is particularly true of *children under five years*, for whom by far the best treatment is "Bryant's Gallows". A beam is fixed transversely some four feet above the bed, a strip of Elastoplast* of suitable width is applied to both outer and inner surfaces of both legs from hip and groin to the soles of the feet, and bound on with soft bandage. Tapes are attached to the ends of the Elastoplast and the child is suspended from the beam with the buttocks just clear of the bed and the legs very slightly abducted. The child's weight provides the necessary traction and the clearance allows for bedpans, etc. A useful refinement is to have counterpoise weights fixed to the tapes so that the child's buttocks can be raised further for cleaning without reducing traction. The younger the child the quicker the union, and suspension can generally be replaced by a light plaster cast after four or six weeks.

For adults there are three main methods of treatment: skin traction, skeletal traction and plating.

SKIN TRACTION

- (1) A general anaesthetic or a liberal (20-50 c.c. of 1-2% Novocain solution) local anaesthetic is given.
- (2) A piece of fresh Elastoplast* about four inches wide is fixed to each side of the leg from about three inches above the fracture down to the ankle; here another piece of Elastoplast is applied to the sticky surface to prevent it from sticking to the skin of the foot.
- (3) A soft roller bandage is bound round the leg from ankle to groin to ensure adhesion of the Elastoplast.

* For all forms of traction the special Elastoplast with transverse, not longitudinal, stretch is used. There is nothing to compare with it.

- (4) Tapes are firmly fixed to the Elastoplast below the ankle.
- (5) A Thomas's splint with flannel inops, adjustable by means of strong paper clips, is threaded over the leg until the ring of the splint nestles against the patient's tuber ischii.
- (6) Against counter-traction exerted by a loop of bandage under the groin, the assistant exerts strong traction on the leg in order to correct over-riding of the fragments; 5-10 minutes of hard pulling usually being required. A portable X-ray is, of course, invaluable, but if none is available the surgeon must trust to his clinical judgment and hope for the best.
- (7) When over-riding has been corrected as shown by the presence of crepitus and with the assistant still maintaining strong traction, the surgeon manipulates the fragments into good position. In a transverse fracture the aim is to gain end-to-end apposition, either partial or complete. Spiral or very oblique fractures are more difficult; probably the best treatment for them, as in the case of the tibia, is a single vitallium or stainless-steel screw, the insertion of which is a task for the specialist.
- (8) An aluminium gutter splint or a light plaster slab is applied on each side of the leg from the hip or groin to below the slightly flexed knee and outside the bandage securing the Elastoplast; the gutter or slabs are bound in place by a roller bandage.
- (9) The foot of the bed is raised 12 inches and the foot of the Thomas's splint tied to the bottom cross-bar. The tapes attached to the extensinn Elastoplast are similarly tied.
- (10) The surgeon makes sure that the flannel loops are keeping the leg in good position, i.e., that the knee is slightly flexed and the anterior convexity of the thigh is maintained.
- (11) The footpiece is applied so as to keep the foot at right angles to the leg.

After-treatment.—The tapes or Elastoplast are tightened as required to compensate for such slipping as takes place. The quadriceps extensor cruris muscle is voluntarily contracted for five minutes every hour during the day. As already remarked, this is most important, because the muscle wastes very quickly, a few days' disuse causing quite a noticeable difference between the two sides. As it is one of the main supports of the knee joint, normal walking cannot be achieved unless it is in good condition. Further, the most tiresome sequel of a broken leg is a stiff knee, but if the quadriceps is conscientiously exercised this trouble is greatly diminished.

SKELETAL TRACTION

This method is less popular than it was, for two reasons: (1) separation and (2) sepsis. It is difficult to adjust the traction satisfactorily so as not to pull the fragments too far apart, and it is difficult to avoid sepsis along the track of the pin or wire. For this reason, traction through the femur above the knee is now never

used, because the very slightest sepsis caused stiffness of the joint. The pin or wire should pass through the tibia just behind the tubercle and should be inserted from without inwards, the point emerging on the subcutaneous surface. This causes some stretching of the ligaments of the knee joint but is preferable to even the mildest sepsis of the joint. The writer prefers a thick Kirschner's wire to a Steinmann's pin as it is less clumsy and with reasonable traction does not cut its way through the bone. The method is comfortable to the patient and has the great advantage that traction is exerted on a fixed point, so nursing is easy and constant adjustments are not required.

Method.—

- (1) Under general anaesthesia or a local anaesthetic injected at the site of puncture and—liberally—at the site of fracture, the pin or wire is drilled through the tibia just behind the tubercle, the greatest antiseptic and aseptic precautions being observed. It is important to get the wire at right angles to the line of traction. Before the stirrup is attached, a small ribbon of gauze freely powdered with sulphathiazole powder containing 1% of proflavine is twisted round each end of the wire where it penetrates the skin, and secured with Elastoplast.
- (2) The Kirschner or Steinmann stirrup is applied to the wire or pin and the traction cord attached.
- (3) A Thomas's splint with a leg attachment to permit flexion of the knee, is threaded over the leg, the flannel slings being above the knee only; the foot end of the splint is raised to an angle of about 30–40 degrees and tied to a post at the foot of the bed, or, better, to the upright of a Balkan beam.
- (4) A roll of gauze is passed under the patient's groin on the affected side to be used as counter-traction. It can be secured to the head-end of the bed.
- (5) The traction cord attached to the stirrup is passed over a pulley at the foot-end of the Thomas's splint and a weight of about 40 lb. attached; gradually, if a Kirschner's wire is being used.
- (6) After five or ten minutes the resistance of the thigh muscles will have been overcome as shown preferably by X-ray examination or in its absence by the absence of shortening. An attempt is now made to manipulate the broken ends into apposition, as shown by crepitus and by the absence of shortening when the assistant gently lifts the weight. If this happy state of affairs is achieved so much the better, but, if not, the heavy extension must be allowed to act for longer. (In a powerful patient it is a good tip to do the operation under a spinal anaesthetic as it produces good muscular relaxation; 10 c.c. of light Percaine is the best because it allows the pelvis to be raised.) Heavy

weight-extension like this must never be left on for more than an hour or two, and is used in early (i.e., in the first 72 hours) reduction of fractures, when it has been found to be ample for drawing the fragments suitably apart.

- (7) When the bones are in apposition, a plaster slab is applied to each side of the thigh, from the hip or groin to just above the flexed knee, and fixed in place with a plaster bandage.
- (8) The weight is now reduced to 10 lb., the calf of the leg comfortably settled in the leg attachment with the knee at an angle of about 135 degrees and the foot at right angles; the foot of the bed is raised and the groin counter-traction removed. Pulleys, hooks, compensating weights, etc., give scope for much ingenuity on the part of the surgeon, the object being to allow comfortable nursing of the patient without disturbing the fracture.
- (9) *After-treatment.*—The quadriceps muscle is exercised at frequent intervals and after about two weeks voluntary movements of the knee are begun. Check X-ray pictures are taken at least once a week, if possible, and the leg is carefully examined for displacement or shortening. The wire or pin is removed at the end of about 12 weeks, by which time union is sound enough to prevent displacement, but not for taking weight, which should be deferred for another month or two, during which time a plaster is worn.

SUPRACONDYLAR FRACTURE OF THE FEMUR.—This is rare, and is mentioned only because, as with the similar fracture of the humerus, treatment is urgent if damage to vessels and nerves is to be avoided, and because Watson-Jones's method is the only satisfactory one so far devised. He puts a Kirschner's wire through the upper end of the lower fragment and raises it into alignment with the upper, while another wire through the tubercle of the tibia maintains traction. Treatment must be carried out by an expert with full radiographic control.

FRACTURE OF THE PATELLA.—This may be transverse, from a sudden spasm of the quadriceps, or comminuted, from direct violence. In the former case, if when the leg is straight the fragments can be brought together easily, they may be sewn together with catgut through the periosteum; wiring is unpopular nowadays, but is often successful, and should be used if simple stitching of the periosteum is inadequate.

If the fracture is comminuted, or if good approximation is difficult, subperiosteal removal of the whole patella, followed by firm stitching together of the ends of the quadriceps tendon, is the best treatment. The writer has had excellent results from this operation.

Should one fragment be very much smaller than the other, it should be excised and the quadriceps stitched firmly to the larger fragment.

The limb should be kept in a walking plaster for about two months, during which quadriceps exercises are faithfully carried out.

FRACTURES OF THE FIBULA.—A fracture at the upper end unassociated with any other lesion is of minor importance and can safely be left to look after itself. A fracture of the shaft from direct violence, such as a blow from a hockey stick, sometimes occurs and causes but little inconvenience.

POTT'S FRACTURE.—This is one of the commonest fractures in the body, and is generally caused by a fall in which the ankle is bent outwards, or the body is twisted while the foot is caught in some object such as a root or a hole in the ground, the fracture due to a twist being naturally more spiral. The typical lesion is a fracture of the fibula in its lower three inches associated with an outward and backward displacement of the astragalus; the internal malleolus (tip of the tibia) is generally broken too.

Diagnosis—This is made by the abducted position of the foot and the tenderness at the site of fracture; if the fibula is pressed at a higher level pain is felt at the site of fracture. Many so-called "sprains" of the ankle turn out to be a Pott's fracture without displacement, so all such cases should, if possible, be X-rayed in both lateral and antero-posterior directions.

Treatment.—The object is to give the patient a foot on which he will be able to stand, walk or run without pain for the rest of his life. Therefore the astragalus must be correctly resettled, without any tendency to either lateral or posterior displacement.

- (1) The patient lies on a table with his knees at the end and both legs hanging down. This flexes the knee and relaxes the tendo Achillis, thereby making it easier to reduce the posterior displacement. Reduction is achieved by pressing the heel strongly forward and dorsiflexing the foot to less than a right angle. (When this can be done the astragalus cannot be posteriorly dislocated.)
- (2) The surgeon now holds the tibia in one hand (left for left and right for right) a few inches above the ankle joint and the heel and outer malleolus in the other hand. Using the upper hand as a fulcrum (compare reduction of Colles's fracture) he now presses the patient's heel and outer malleolus mesially as firmly as he can; this replaces the astragalus in its socket and corrects the deformity of the external malleolus.
- (3) Meanwhile the position of dorsiflexion is maintained by resting the ball of the patient's foot on the surgeon's knee.
- (4) The assistant applies and moulds two plaster slabs, the plantar one extending from beyond the patient's toes to the back of the knee, and the dorsal one from the base of the toes to the tubercle of the tibia.
- (5) The assistant fixes the slabs in place with plaster bandages and the surgeon must maintain the lateral pressure and keep the patient's foot at a right angle not only during the

application of the plaster but until it has set firmly, otherwise redisplacement will occur.

- (6) In the final position the foot should be at a little less than a right angle and should also be slightly inverted.

After-treatment.—If the case has been seen in the first few hours the patient is put to bed for two or three days with the knee bent and the leg raised, while a careful watch is kept on the circulation in the toes. If the plaster becomes loose later on, it is removed and replaced, with all the original precautions against displacement, which, in this fracture, is particularly liable to occur.

The patient may be allowed a walking plaster (see above) after about a week.

FRACTURE OF THE TIBIA.—As this bone is subcutaneous, the fracture is often compound, but it is also palpable, so fracture of the shaft can be more accurately "set" without X-rays than those of other bones. *Fracture of the upper end* may be T-shaped and result from a fall on the feet, but more commonly it follows a severe blow or crushing injury to the outer side of the knee while the foot is fixed, the results of which can easily be deduced from the anatomy. The knee joint is forced into a position of extreme valgus, so (a) the internal lateral ligament is torn, (b) the outer condyle of the femur drives into and crushes or actually splits off the outer tuberosity of the tibia, (c) the neck of the fibula is likely to break, (d) the anterior crucial ligament may be torn, (e) the joint is filled with blood, and (f) there may be great swelling and pain.

Accurate diagnosis is possible only with X-rays, but the lesion is suspected from the history and clinical condition.

Treatment.—

- (a) Strong traction is applied to the leg.
- (b) Strong lateral pressure is applied to the sides of the tibia by the surgeon's hands, or if this is not sufficient, by a Böhler's compressor; if this instrument is not available, the surgeon can use his ingenuity and construct an improvised vice, or he may be able to borrow one from a friendly mistri; the vice must be padded before use.
- (c) The whole limb is immobilized in plaster; if there is a great deal of effusion into the joint a large posterior slab extending from the fold of the buttock to the base of the toes is applied; it must extend round at least half the circumference of the knee and is fixed in place with a soft bandage which is replaced by a plaster one when the swelling has subsided. But as a general rule the limb can safely be enclosed in plaster.
- (d) The position of the fragments is checked by X-rays if available. If the position is bad, every effort must be made to correct it.

After-treatment.—As the fracture is lateral to the tubercle of the tibia, the quadriceps—as in all leg injuries—is exercised early and

hourly; needless to say, this is not done if the tubercle of the tibia is affected. The average torn ligament needs ten weeks' complete immobilization in which to heal. Plaster and immobilization are therefore continued for that time.

FRACTURE OF BOTH BONES OF THE LEG.—As the treatment of this condition is the same as that of fracture of the shaft of the tibia only, they will be described together.

Diagnosis.—Signs are usually so obvious—often including a spike of bone sticking through the skin—that no description of the typical case is needed.

The greenstick or subperiosteal fracture is less obvious, but tenderness and slight angulation can generally be found. The treatment of this condition is not to displace the fragments, and to apply plaster from the toes to the middle of the thigh with the tibia in perfect position and the knee very slightly flexed. The plaster is kept on for six or eight weeks and replaced if firm union has not taken place.

Fracture of both bones is a common injury and can be a very disabling one. As in other bones (or, as the reader may see for himself, in a matchstick) fractures due to direct violence are transverse and those due to indirect violence are oblique. It may be said at once that for the oblique fracture strong traction followed by the insertion of a single vitalium or stainless-steel screw to hold the fragments of the tibia is probably the best treatment if absolute asepsis can be assured. Immobilization in a plaster cast from mid-thigh to the base of the toes is kept up until union is secure, usually after about three months. Quadriceps exercises are carried out as usual. The fibula generally looks after itself.

In a transverse fracture of both bones, strong traction and skilful manipulation should bring the fragments into end-to-end apposition, which is shown by crepitus and absence of shortening. If this is achieved, plaster is applied from the groin to the toes, with the knee slightly flexed; after-treatment is as above. What are we to do, however, when the tibia seems to be comminuted, no operative treatment is possible, and even X-rays are not available? If there is a Kirschner's wire or a pin it is inserted with the usual precautions, through the tibia about an inch above the malleoli; the patient's leg is hung over the end of the table and strong traction made upon the pin or wire, e.g., with a weight of about 20 lb. The surgeon then palpates the fracture and manipulates the fragments into position; it is essential to know whether the fracture line runs from front to back or from side to side, because the fragments must be strongly pressed together if they are to unite. If there is no pin, traction is made through a bandage passed over the foot and ankle as a clove hitch; the rest of the treatment is the same.

While traction is continued, the leg and foot are enclosed in plaster of Paris, the surgeon pressing the fragments together laterally or from front to back, the pin or bandage being included in the plaster and the foot being at a right angle; as soon as the plaster

sets, the flexion of the knee is reduced to about fifteen degrees from the straight and the plaster continued up to the groin. Traction is maintained until the plaster has set.

After-treatment.—Quadriceps and toe drill are necessary. No weight is allowed on the leg till union is firm. After the plaster is finally removed an Elastoplast bandage or a good elastic stocking must be worn, perhaps for several weeks, otherwise there will be troublesome oedema.

The plaster should never be shortened to below the knee, as this allows rotary movements between the fragments, with consequent non-union.

FRACTURE OF THE OS CALCIS.—The common cause is a fall from a height, the patient landing on his feet; a very important thing to remember is that about 10% of these fractures are *associated with a crush fracture of the spine* and about the same number are bilateral; the spine and the other foot should, therefore, always be examined.

The os calcis articulates above with the astragalus (talus) and in front with the cuboid; the heel is formed by a bony prominence on the posterior under surface of the os calcis, more marked on the inner than on the outer side.

Let the reader take a piece of sealing-wax about an inch and a half long to represent the os calcis, and under one end put a pencil to represent the bony prominence forming the heel; now, taking the handle of a knife to represent the astragalus, let him press gently on the "front" half of the sealing-wax until it breaks; it breaks between the handle of the knife and the pencil. He now arranges another piece of sealing-wax in the same way and presses very hard or hits it smartly with the handle of the knife; the wax breaks up into several fragments as the handle of the knife cleaves through it, and the fragments scatter in all directions.

Attached to the heel of the os calcis are two sets of muscles, the calf muscles tending to draw it upwards and the plantar muscles tending to draw it forwards. To relax the calf muscles, plantar-flex the foot and bend the knee; to relax the plantar muscles, plantar-flex the foot.

From the above considerations we now see:

- (a) That a fracture may or may not involve joint surfaces, the former, of course, being much the more serious.
- (b) How a fracture occurs.
- (c) The usual position and nature of the fracture.
- (d) The nature of the displacement.
- (e) The best position of the foot and leg for effecting reduction.

In a comminuted fracture the fragments are also separated laterally, a very important point, because if they are not tightly pressed together (Böhler's "redresseur" is the best instrument for doing this) there will be permanent pain and lameness.

The simplest way of reducing the rest of the displacement is by means of a Steinman pin driven firmly forward into the posterior

fragment from behind. With the knee flexed and the foot plantar-flexed, the fragment can then be manipulated into position and a firm plaster, including or not the pin, applied. The plaster is retained until union is firm, generally a matter of about two months. Pain on weight-bearing means incomplete union.

FRACTURE OF THE ASTRAGALUS (TALUS).—The usual injury is a fall or blow on the forefoot, causing forcible dorsiflexion of the foot, and the common site of fracture is the neck of the astragalus, partly because it is the weakest part and partly because it is forced against the lower edge of the tibia, which acts as a fulcrum.

The very important point, however, is that the posterior fragment is generally dislocated, and unless the dislocation is reduced the patient will be a cripple.

In a simple case the fractured surface of the posterior fragment looks downwards, forwards and slightly outwards, so all that is needed in order to bring the two broken surfaces together is to plantar-flex and evert the foot, and keep it in that position in plaster for two months.

In more severe cases the rotation is greater, and the broken edge may be caught behind the articular surface of the os calcis. Should other means fail, the most powerful method of reduction is by downward and backward traction on a pin through the os calcis—the knee being flexed and the foot plantar-flexed—while the dislocated part of the astragalus is manipulated by another pin thrust into it from behind. Skill, asepsis and X-rays are necessary for this manoeuvre, but it is mentioned here because it may at times be of vital importance.

FRACTURE OF THE METATARSALS.—Occasionally the base of the fifth metatarsal is torn away by spasm of the peroneus brevis (Jones's fracture) and sometimes a march fracture of the metatarsal necks occurs which may not be diagnosed until X-rays show the callus, but the usual cause is that the foot falls on something or something falls on the foot. Fracture generally occurs in the thin distal part of the shaft and one or more bones may be affected.

Treatment is plaster for about two months, the foot being at right angles, the plantar slab extending from just beyond the tips of the toes, and the dorsal one from the base of the toes, to below the knee. A walking heel is attached as soon as the plaster is firmly set. If there is tendency to overlapping or bad displacement, extension is applied to the affected toes by Elastoplast or by wires through the pulps, attached to rubber bands which are fixed to a loop ("banjo") of wire incorporated in the plaster.

FRACTURE OF THE SPINE.—

WITHOUT INJURY TO THE SPINAL CORD.—This is not uncommon, and may be unsuspected, the usual lesion being a crush fracture of the bodies of one or more vertebrae in the dorsolumbar region. The injury is caused by forcible flexion of the spine,

as by a fall from a height (often causing fracture of the os calcis as well) or by accidents of various kinds. Clinically, undue prominence of the spine of the affected vertebra is the most valuable sign, but a lateral X-ray photograph is essential for accurate and certain diagnosis.

Treatment.—This can be expressed in three words: fixation in hyperextension. Once the condition has been diagnosed or even suspected, the spine must *at no time* be flexed, as this may cause great damage. (The only exception is the rare lumbar fracture-dislocation with locked articular processes, which must be freed or removed before hyperextension is safe.) The patient puts on a thin cotton vest, a bathing suit or some such closely fitting garment which extends from the shoulders to below the groins, and the bony prominences are lightly padded.

Two tables, or a long seat and a table, are taken, one being about a foot higher than the other, and placed at a distance equal to that from the patient's chin to the middle of his thighs. The patient is now lifted so that his chin (not his chest), supported on his raised and folded arms, rests on the higher table while his legs (not his body) rest on the lower. He now relaxes, putting his belly as near the floor as possible. This causes hyperextension of the spine, which not only relieves compression of the crushed vertebral bodies, but, thanks to the exceedingly strong anterior common ligament, replaces any fragments that are out of place. It is essential for the spine to be fully hyperextended with the lumbar concavity as deep as possible.

Previously prepared plaster slabs, four inches wide, twelve layers thick and long enough to extend from the shoulders to the fold of the buttocks, are now laid on the back, one on each side of the spine and quickly bandaged on with plaster bandages. When a few tueros have been taken, two similar slabs, extending from the clavicles to the groins are applied to the abdominal and chest walls, and bandaged in place. Circular plaster bandages are applied until a complete jacket has been made, which may be reinforced with other slabs over the lumbar area.

It is important for the jacket to extend from the clavicles to the groin in front, and from the shoulders to the folds of the buttocks behind, otherwise immobilization is incomplete. When the plaster is crisp it may be trimmed to allow comfortable use of the excretory passages, and a little later the patient may be moved. An abdominal window brings great comfort to the flatulent patient.

After-treatment.—It is important to exercise the back muscles and to let the patient get about. In England these patients play all games, such as cricket, etc., with infinite benefit to their backs and their morale.

FRACTURE OF THE SPINE WITH SPINAL-CORD INJURY.

—There is paralysis below the lesion, which is practically always a fracture-dislocation, a vertebra being forced forward and the spinal cord nipped between its arch and the upper edge of the body of the vertebra below.

The anatomist will remember that in an adult the spinal cord ends at the lower border of the first lumbar vertebra, so injuries below this affect the cauda equina, which, being composed of peripheral nerves, can recover, while the cord itself cannot. He may also remember that the lower the cord gets in the spinal canal the more room it has. Thus an injury which would completely cut it across at the tightly packed dorsal enlargement might only bruise it lower down. These facts are of importance both in prognosis and in treatment.

Prognosis.—Sometimes the condition known as spinal shock is seen; it used to be thought analogous to concussion of the brain, because although paralysis is complete at first it passes off in less than 24 hours; it is probably due to minute haemorrhages.

Like any other tissue the spinal cord reacts to injury by becoming swollen and hyperaemic; this reaction may cause pressure on the motor and sensory tracts and interference with conductivity. The condition always clears up within three weeks, in fact any paralysis remaining after that time is likely to be permanent; this is not true of the cauda equina, which, being composed of peripheral nerves, can go on improving for years. So lumbar injuries have the best prognosis.

X-ray examination, especially lateral photographs, should be done as soon as possible, but there is the fallacy that the bones may have moved between the accident and the taking of the pictures. However, if the X-ray picture shows fracture-dislocation with narrowing or obliteration of the spinal canal above the first lumbar vertebra, complete and permanent paralysis below the lesion can safely be prophesied.

Examination.—If paralysis is flaccid and complete, with bladder and rectal incontinence, and if painful stimuli are not noticed, the condition is unlikely to recover. A simple test recommended by Watson-Jones is to flex one of the patient's toes so forcibly that he would normally scream with agony. If he does not notice, the paralysis is permanent, but if he feels the experiment at all, the lesion is incomplete and some recovery may occur.

Treatment.—As early reduction with hyperextension is the only treatment that can be of benefit, it should always be carried out in the manner already described, the one contra-indication to hyperextension being, as mentioned before, the uncommon lumbar fracture-dislocation with locked articular processes.

The bladder.—This must never become distended, but catheterization must be avoided if possible; suprapubic drainage, with a closely fitting, indwelling (de Pezzer) catheter is the treatment which has given the best results and the least sepsis.

The skin.—A well-fitting plaster cast, if the bony parts are properly padded, seems no more likely to cause bedsores than any other form of treatment, one reason being that the patient's position can be changed without damaging his spine.

BROKEN NECK.—The treatment is complete immobility until a

plaster jacket, from the crown of the head to the pelvis, can hold the head firmly with the neck fully extended, but such cases are for the expert in hospital, whither they should be sent.

BROKEN PELVIS.—If the bladder or urethra is damaged, it receives the usual surgical attention, but the important point about treating the fracture is that the patient must lie on his side; a moment's thought will show that this position helps to bring the fragments together, but lying on the back tends to separate them.

COMPOUND FRACTURES (*See also Shock, Wounds.*)

Cheomotherapy has changed the whole treatment and outlook. A method which has given excellent results is as follows:

- (a) Treat shock (*q.v.*).
- (b) When shock has been overcome and the patient is fit for operation give an intravenous anaesthetic.
- (c) Cleanse the skin thoroughly and disinfect it with flavine, mercurochrome or Dettol.
- (d) (i) In mild cases without much tissue damage, and in which it is unlikely that there is dirt or a foreign body in the wound, irrigate with sterile normal saline to remove any clots, etc., fill the wound with penicillin solution, 500 units per c.c., and sew up. Then treat as a simple fracture, but give parenteral penicillin for four days.
- (ii) In severe cases with much trauma, open up the wound, removing any dead tissue, loose fragments of bone or foreign bodies. When it is as certain as possible that everything in the wound is viable, and haemostasis is perfect, insert two small drainage tubes into the depths of the wound and sew up.

The following points are important:

Do not use buried sutures; put in deep interrupted silkworm gut or nylon stitches.

Bring the skin edges together without tension, rotating a flap of skin and fat if necessary, or applying a skin graft if the bare area is muscle.

When the wound is closed, inject 3 c.c. of penicillin solution, 500 units per c.c., through each tube. Apply a dry dressing with the tubes coming through it, and finally plaster of Paris, through which the tubes project for three inches. Twice a day for five days inject 3 c.c. of the 500 units per c.c. penicillin solution through each tube and give 100,000 units daily by parenteral injection. At the end of five days remove the tubes and treat as a simple fracture.

- (iii) If penicillin is not available in adequate quantity, carry out stages (a), (b) and (c) as above, but scatter sulphathiazole-flavine powder throughout the wound, sewing up if it is within six hours of injury, but packing with sterile Vaseline or Cibazol ointment gauze and leaving the wound open if it is more than six hours after injury. Apply a plaster-of-Paris bandage so as to immobilize the fracture and to enclose the wound.

FRECKLES

These may be removed by touching daily with mercuric chloride solution 1% in alcohol on the end of a match.

FRONTAL SINUSITIS—See Nose, Diseases of.

FURUNCULOSIS—See Boils.

GALL-STONES (See also Cholecystitis, X-Rays.)

The medical treatment of gall-stones is chiefly directed to the prevention and relief of pain, and to exercising the gall-bladder. So far no drug has been discovered which dissolves gall-stones *in situ*.

Antispasmodics include atropine and the newer synthetic preparations such as Syntropan and Transentin. A good antispasmodic mixture is as follows:

R. Hexamin	.	gr 15
Tinct. Belladonnæ		℥ 5-10
Tinct. Hyoscyami		℥ 3j
Aq. Chlorof. ad		℥ 3j
3j tds		

Hexamine is excreted into the bile, but its antiseptic action is very doubtful. Bile salts are the best cholagogue and are contained in many preparations, such as Bicolate and Veracolate. Another good cholagogue is a saturated solution of mag. sulph. of which one or two drachms should be given every morning, but it is singularly unpleasant to take; finally, fats cause the gall-bladder to empty.

Many people, especially middle-aged multiparae, harbour unsuspected gall-stones, but if there are symptoms and the patient's condition permits, cholecystectomy is the best treatment. The diet should be plain and free from substances such as eggs, which contain cholesterol of which gall-stones are often composed. Fats should be taken in great moderation and vegetable fats are generally preferred to animal fats. Another reason for cutting down fats is that patients with gall-stones are often obese.

GANGLION

If a ganglion is rendered tense by full flexion of the neighbouring joint, it can often be burst and therefore dissipated by being given a sharp, hard knock with some heavy object (the Family Bible is the classical weapon, but a text-book on surgery does very well). Firm massage with the operator's thumbs may have the same effect. If the ganglion has to be dissected out, the greatest aseptic precautions must be taken because it may communicate with a tendon sheath.

GANGRENE

This can be divided into (1) Dry, (2) Moist and (3) Gas gangrene. Dry gangrene occurs when the limb is empty of blood, as in the gradual obstruction of senile or diseased arteries, whereas moist gangrene occurs when the limb is full of blood as in the sudden obstruction of trauma or embolism, or where a tight bandage or plaster obstructs the veins first and the consequent swelling presses

on the arteries and finally obstructs them. Gas gangrene is due to infection with gas-forming organisms and responds well to vigorous chemotherapy combined with prompt excision of the affected area.

TREATMENT.—Amputation is required for severe pain, spreading infection or for aesthetic reasons, but except for spreading infection there is no urgency about it, and as a rule a line of demarcation should be allowed to form. In the case of senile gangrene, which generally affects the toes, amputation is performed above the knee, because the blood supply in the calcareous vessels is so poor below that level that the flaps will slough and a new focus of gangrene be formed. In spreading gangrene or when a spreading infection is uncontrollable by chemotherapy, amputation should be performed well inside normal tissue, never through the infected area. In other cases, amputation can be performed reasonably close to the gangrene, so long as the incision goes through healthy, freely-bleeding tissue. If a tourniquet is used it must be a broad one and must be released during the operation to make sure that the proximal tissue bleeds.

In fair-skinned patients a simple way of finding the distance to which circulation is adequate is as follows: with a warm patient in a warm room, raise the affected limb and after two minutes apply a tourniquet; leave this on for about five minutes, make the limb level and remove the tourniquet; the lowest limit of the flushed area is the lowest permissible place for amputation.

OTHER TREATMENT.—

Embolie gangrene.—Immediate embolectomy can save the limb. An embolus generally lodges at the bifurcation of an artery and the limb distal to it may be intensely painful. If the area cannot be reached or cannot be opened without endangering the patient's life, the artery may be opened lower down and a long probe passed up to the embolus, which is broken up.

Thrombo-angiitis obliterans.—This is not uncommon in India and China. Lumbar sympathectomy, by causing vasodilatation in the legs, benefits the condition, but symptoms are apt to recur after the lapse of years.

Syphilis.—This should be remembered as a cause of gangrene in a young person and should be treated if the blood tests are positive.

Diabetic gangrene.—This is usually moist and very painful, and early amputation is required.

As a rule the gangrene begins on the side of the foot, not in the toes. Medical treatment is advisable before amputation.

Raynaud's Disease.—This is rare in India because of the warm climate, the characteristic vasoconstriction never occurring in a temperature above 52 degrees Fahrenheit. Alcohol has been injected into the stellate ganglion with success, but the surest preventive is not to let the hands or feet get cold. Severe cases may suffer from gangrene of the fingers, toes or ears.

Moist gangrene.—If infected, amputate through non-infected tissue, leaving the flaps open. If there is no infection the limb is powdered and kept dry with the idea that in due course it will

mummify and a line of demarcation form, but if there is much pain amputation may be required. Prevention of gangrene can be summed up as maintenance of the circulation and avoidance of infection. The limbs should be kept warm and dry, reasonably exercised, not constricted by tight clothing or footwear and not subjected to minor operations such as the removal of corns or bunions or to the abrasions incidental to badly-fitting footwear or the cutting of the nails.

Frostbite.—When the hands or feet are frostbitten they should never be warmed quickly, otherwise the blood rushing into the damaged vessels permeates them, causing oedema, arrest of circulation and gangrene. The old method of rubbing the affected part with snow is good, and the return of the limb to warm air must be gradual. If gangrene occurs, keep the parts dry and amputate immediately above the line of demarcation when this is clear.

GASTRALGIA

This is a painful dyspepsia generally seen in young anaemic women and is probably due to erosions of the gastric mucous membrane. To begin with, bismuth should be given in full doses, and then combined with iron. It is absolutely essential to keep the patient in bed. The following prescriptions have proved useful:

<i>Hysterical</i>		<i>Anaemia</i>	
B. Calci Bromidi . . .	gr. 12	B. Ferri et Quin. Cit. . .	gr. 10
Chloral Hydrat. . .	gr. 4	Liq. Strychninae . . .	℥ 3
Codeinae . . .	gr. ½	Acid. Hydrochlor. Dil. . .	℥ 5
Aquae Laurocerasi . .	℥ 15	Aqua. Chloroformi ad . .	℥ 3
Aquam ad . . .	℥ 3	t.d.s., an hour after food	
<i>Hysterical, with Vomiting</i>		<i>Cause Unknown</i>	
B. Morph. Hydrochlor. .	gr. ½	B. Liq. Opii Sedativi . .	℥ 5-10
Cocain. Hydrochlor. . .	gr. ½	Spt. Amm. Aromat. . .	℥ 5ss
Tr. Belladonnae . . .	℥ 3	Aqua. Carui ad . . .	℥ 3
Emulsionis Amygdalae	℥ 3	When the pain is severe	
<i>Gouty</i>			
B. Amm. Carb. . .	gr. 5	B. Ext. Belladonnae . .	gr. ½
Spt. Aetheris Co . . .	℥ 20	Quin. Sulph. . .	gr. 2
Aqua. Menth. Pip. ad . .	℥ 3ss	Ext. Valerian. . .	q.s.
Every 3 or 4 hours.		One pill t.d.s.	

GASTRIC AND DUODENAL ULCER

Regarding the vexed question of medical or surgical treatment, Devine (*Surgery of the Alimentary Tract*, a stimulating and original work which all abdominal surgeons should possess) writes:

"In cases of both acute and subacute gastric and duodenal ulcer the treatment will always be medical, even if these ulcers bleed.

"In chronic gastric or duodenal ulcer which are associated with no definite ulcer diathesis and no secondary fibrotic changes medical treatment gives every prospect of permanent cure . . . but in chronic gastric or duodenal ulcer with which is associated a definite, perhaps causative, diathesis, although temporary cures may be obtained under medical treatment, a permanent cure cannot be

expected. For instance, the duodenal ulcer associated with a high acidity and a very quick emptying time will keep recurring after being medically cured, because the muscular stomach and the high acidity are the causative factors, and cannot be permanently removed by medical treatment. Such a type of ulcer, if very chronic, generally requires surgical treatment.

"In the case of a gastric ulcer which is old and very chronic, and is accompanied by secondary fibrotic changes, there is much danger in continued medical treatment. Such an ulcer, too, has very little chance of healing naturally, especially if it is complicated with a stenosed and therefore crippled stomach.

"Although in the case of duodenal ulcer associated with a diathesis, with penetration or with secondary fibrotic changes, medical treatment does not offer much prospect of permanent cure, it should be remembered that surgical treatment is not so successful and satisfactory as it is in gastric ulcer in similar circumstances.

"Of recent years, since medical treatment become 'fashionable' I have seen a number of cases of gastric cancer treated as gastric ulcer, until the lapse of time showed the true nature of the case. In some of these cases even an expert radiologist may not be able to demonstrate a 'filling defect' characteristic of carcinoma."

Further, surgical treatment is required when there is perforation, stenosis, repeated haemorrhage, hour-glass stomach, or a suspicion of malignant disease, but even in the most expert hands the cure-rate of gastric cancer is lamentably low.

MEDICAL TREATMENT.—The late Sir Arthur Hurst, whose treatment is most generally followed and has stood the test of time, gave details in the last edition of this work; these are given below, slightly modified.

In India, Hurst's regime is very difficult to carry out because the average patient cannot realize that he may be ill even though he feels well, and as soon as symptoms disappear, he wants to be up and doing.

- (a) Take a careful history; in no disease is the history more important.
- (b) Make a careful clinical examination, noting any tender spots, particularly in the epigastrium and over the appendix area, also take the blood-pressure, examine the tongue, the heart, the nervous system and the urine.
- (c) Have the stools examined for parasites, especially *Ankylostoma duodenale*, and occult blood.
- (d) Have a test meal done, and repeat it after two days.
- (e) Have an X-ray-barium meal examination done to discover the size, shape, mobility and emptying time of the stomach, the shape of the "duodenal cap", the exact location of any tender spot, the presence and situation of any ulcer or other lesion, and the state of the appendix.

The presence of a peptic ulcer suitable for medical treatment being established, proceed as follows:

GENERAL TREATMENT.—

- (a) Tell the patient that he must go to bed for three weeks, that in his own interests he must submit himself to the routine prescribed, and that it will be unnecessary to call in other physicians with rival methods of treatment.
- (b) Admit him to hospital or engage a competent nurse, otherwise the relatives are liable to give him unauthorized additions to the diet or medicine. (In cases of unexplained failure of treatment such a possibility should always be remembered.)
- (c) The patient may move about in bed and may go to the lavatory for the purposes of nature; he may also have a bath once or twice a day.
- (d) Weigh the patient once a week.
- (e) See that the teeth are clean and in good order. Septic teeth call for removal and artificial teeth must be supplied if needed. Imperfectly chewed food is bad for a peptic ulcer.

DIET.—As long as the patient is in bed feeds are given two-hourly, and water is given between meals if required.

First Week.—Citrate milk (2 gr. sodium citrate to each ounce) every two hours from 6 a.m. to 8 p.m. inclusive, with two milk feeds during the night. This gives 5 pints of milk in the 24 hours—2,000 calories.

Second Week.—If the patient is not a vegetarian give a beaten-up egg (150 calories) with the 8 a.m. and 8 p.m. feeds and a piece of dry toast and honey or glucose (about 50 calories) with the 10 a.m. and 6 p.m. feeds.

If the patient is a vegetarian give a vegetable-puree soup made with milk and filtered through gauze at the 8 a.m. and 8 p.m. feeds and the toast and honey as above.

During this week, as in Hurst's routine, Benger's Food, Ovaltine, Horlick's milk, etc., may be given instead of any milk feed, but each feed should be 5 ounces.

Third Week.—Three to four ounces of creamed fish, chicken, potatoes, carrots or dal may be taken at the 8 a.m., 2 p.m. and 8 p.m. meals as well as milk. The patient is now receiving enough calories to enable him to get up, so he is gradually allowed up, but not to put on his day clothes until the fourth week, after which he slowly resumes a normal diet, but he must have either food or 5 ounces of milk every two hours until symptoms and X-ray examination show that the ulcer is healed.

Subsequent Routine.—Spiced foods, foods with pips, greasy foods and pastry are not allowed.

Alcohol, if taken, must be well diluted and taken with or after meals.

The patient must never smoke more than 1½ hours after a meal. Cigarettes are better than pipes or cigars.

Meals must be regular and never more than four hours apart.

Reasonable outdoor exercise is necessary and the patient must be as free from mental strain as possible.

Constipation must not be permitted.

Drugs.—In the writer's experience the most successful antacids are colloidal aluminium hydroxide and magnesium silicate, especially when mixed with a little belladonna, which diminishes both secretion and spasm, and should be added to the powder in the proportion of one and a half grains of Pulv. Belladonnæ or half a grain of Extract. Belladonnæ Siccum to each ounce of the powder, or 8 minims of Tinct. Belladonnæ to each ounce of a liquid preparation of colloidal aluminium hydroxide. A teaspoonful of the powder or liquid is taken in water an hour after each meal; in some cases two teaspoonfuls are required. Some preparations of colloidal aluminium hydroxide, e.g., Aludrox (Wyeth), Lactalumina (Crookes) are sold in liquid form. If the belladonna does not suit the patient it may be omitted or given only at bedtime.

In addition to the above, an ample allowance of vitamins is given, such as 10,000 units of vitamin A, 6 milligrams of vitamin B, and 100 milligrams of vitamin C every 24 hours.

Any attack of pain should be relieved immediately by a dose of antacid.

An alkaline powder may be used, but is not so satisfactory; the following is about the best:

B. Bistuth. Carb		
Magn. Carb. Pond.	1	part. 222
Sod. Bicarb.		
Crete Præp.	1	

the dose being a teaspoonful one hour after food, or Maclean's Powder may be used instead.

At bedtime the patient should swallow a dose of antacid with belladonna and a tablespoonful of olive oil, and he should have doses of his medicine and at least half a pint of milk by his bedside.

The prolonged use of adsorbents is not recommended because they partially prevent absorption of certain foodstuffs, notably vitamins.

Many patients, both in India and elsewhere, get weary of prolonged medical treatment, with the constant fear of recurrences, the feeling of malaise and the interruptions in their work, so they demand something better and quicker in the way of treatment. For this class of patient Somervell of Nejoor, who has more experience of peptic ulcer than anyone else in the world advocates his operation of physiological gastrectomy, in which he ties four out of every five of the arteries on the anterior and posterior walls of the stomach and then does a posterior gastrojejunostomy. The operation is both easier and safer than partial gastrectomy and much more beneficial than simple gastrojejunostomy. After Somervell's operation the gastric acidity is greatly reduced. The efficacy of the operation is shown by its popularity among the people of Travancore, among whom the incidence of peptic ulcer is probably the highest in the world.

Examination of Stomach Contents

The old-fashioned test breakfast of Ewald has been replaced by the fractional test-meal, which gives information as to the resting juice, the gastric secretion throughout the period of digestion, the secretion of mucus, regurgitation of bile and duodenal contents, and an accurate estimate of the rate of the stomach emptying.

Gastric Lavage

Gastric Lavage or washing out the stomach is indicated in cases of poisoning, in gastric disturbance in children, in the various conditions of chronic gastritis, to remove fermented food and excessive secretion of mucus, for persistent post-operative vomiting and for the faecal vomiting of intestinal obstruction and peritonitis.

The tube should be of soft, red rubber, 30 inches long, with a solid end and two or three lateral openings. The tube should be connected, by a glass junction, to another piece of tubing, about 30 inches long, attached to a rubber funnel. A tube that is weak or cracked should never be passed.

Attention to the following details will lessen the discomfort to the patient.

- (1) Artificial teeth should be removed.
- (2) If the tube is passed in a sitting position, the head should be slightly flexed.
- (3) The tongue should never be depressed as this causes the patient to involuntarily hold his breath or to vomit.
- (4) The tube wet with water—never greased—is introduced into the posterior pharynx, and the patient instructed to swallow, at the same time breathing deeply and regularly.

In children, the patient is held by a towel passing round the body, holding the arms down, the mouth being opened with a gag. A soft rubber catheter is used as the stomach tube.

ACUTE GASTRITIS.—The causes are excess of irritating and indigestible food, alcohol, arsenic, food poisoning by the *Salmonella* group and poison gases such as chlorine.

TREATMENT.—This is to remove the cause, and give a good purge—castor oil \mathfrak{zj} to \mathfrak{ziss} —if there is not much vomiting. In persistent vomiting lavage of the stomach is necessary. Hot fomentations or stupes to the epigastrium are prescribed. Stop all food for at least 24 hours and when the stomach has been emptied of its irritating contents give:

R Bismuth Carbonat.	gr. 20
Liq Morph. Acet.	\mathfrak{m} 12
Mucilag. Acacia	q s.
Aqua. Chloroformi ad	\mathfrak{zj}

Every 4 hours.

CHRONIC GASTRITIS.—Causes are oral sepsis, alcohol in a concentrated form, defective mastication and unsuitable food, certain drugs such as colchicum, mercury and squill, and it occurs secondary to cardiac and respiratory disease and cirrhosis of the liver.

TREATMENT.—Remove or treat the cause. Lavage is of great importance; Hurst recommends hydrogen peroxide \mathfrak{zss} to the pint, which removes the excess of mucus. If the patient will not submit to

lavage large drinks of hot water or a mineral water such as Vichy are given. Medicinal treatment is of little value unless the cause is first removed, then the above bismuth, hydrocyanic acid and morphia mixture may be given. Later a combination of alkalies and bitters, or if there is much fermentation sodium sulphocarbolate as in the two following prescriptions:

R Sod. Bicarb.	gr. 10	R Sod Sulphocarbolutis	..	gr 12
Tr Rhei Co	℥ 15	Sod Bicarb	.	gr. 12
Tr. Zingerberis	℥ 30	Sp Ammon. Aromat.	.	℥ 30
Inf. Gentian. Co. ad	℥ 3	Tr Gentian. Co.	.	℥ 30
t d.s p c.		Aqua. Chloroformi ad	.	℥ 3
		Two tablespoonfuls	one hour after	food

GASTRITIS, ACUTE, IN CHILDREN

The patient should be kept warm in bed with hot fomentations to the abdomen. If vomiting has not emptied the stomach it should be washed out with warm water containing sodium bicarbonate. No food should be given and only sips of water allowed until all acute symptoms have subsided. The bowels should be emptied by an enema and a simple bismuth mixture given.

GASTROPTOSIS

The great majority of patients who complain of gastroptosis are the subjects of neurasthenia, and their symptoms are due to this condition, and not to any displacement of the stomach.

GENU VALGUM—See Knock-knee.

GIDDINESS—See Vertigo.

GLANDERS

This disease is caught from horses or donkeys and is rare in man.

Acute glanders begins as a severe inflammation of the nasal mucous membrane, which rapidly involves the whole nose. Toxaemia is severe and death from pneumonia usually follows.

Chronic glanders is occasionally the unsuspected cause of a chronic severe nasal discharge.

TREATMENT.—This is by drastic cauterization of a recently infected area. Chemotherapy, especially with penicillin, together with immune serum, if available, is pushed vigorously.

GLANDULAR FEVER

Cases of this disease are occasionally met with in India. The patient is usually young, the enlargement of the glands commonly begins in the neck after two or three days' fever, or there may be high fever, and the throat is normal. The blood usually shows a mononucleosis after several days and the Paul-Bunnell heterophil antibody reaction is positive after about the fourth day. The disease

may last about 10 days, a month, or several months and there may be relapses.

Treatment is by sulphonamides; penicillin, however, is useless.

GLAUCOMA—See Eye.

GLOSSITIS—See Tongue, Diseases of.

GLUCOSE

Glucose is a valuable therapeutic agent in a large number of conditions. Given alternately with sodium bicarbonate by rectum, by mouth, or intravenously, it is the best treatment for acidosis. In hypoglycaemia due to over-dosage with insulin the symptoms are at once relieved, and it is also given in conjunction with insulin for the treatment of diabetic coma. It has been used with advantage in cyclical vomiting and asthma of children. It has also been used as an injection for varicose veins, as a surgical dressing, and is the best method of rectal feeding; given by the mouth it is a valuable food for patients with pyrexia or great debility as it requires no digestion before assimilation.

As regards uses before and after operations, the following summary is taken from the *Extra Pharmacopoeia*:

Always before a severe operation: (1) When liver efficiency is suspected; (2) when the metabolic rate is high; (3) when the patient is under-nourished or emaciated.

Always after a severe operation when blood transfusion is impossible.

After any anaesthetic: (1) When the loss of blood has been considerable, and blood transfusion is impracticable; (2) in case of shock, (3) when it has not been given before the anaesthetic; (4) when there has been excessive disturbance of the tissues, or an unusually large amount of anaesthetic has been given; (5) when there is a history of epilepsy.

ADMINISTRATION.—Intravenously it is given in a 7% solution. Subcutaneously 4-5% solution up to 2 or 3 litres representing 90-210 grammes of glucose. Per rectum: a 6% solution in tap water (525 grains to the pint); stronger solutions may be tried, but as a rule anything above 6% isotonic solution is retained with difficulty. It must not be given in normal saline as then being hypertonic it is absorbed with difficulty.

GLYCOSURIA (See also Diabetes Mellitus.)

Low Renal Threshold is important chiefly because the blood-sugar is already low and insulin may make it dangerously so; the condition is suspected if the urine shows a little sugar after meals, and is confirmed by a blood-sugar curve. The glycosuria can often be abolished by forbidding sugar but allowing starch. It has been known to develop into diabetes mellitus, so periodic examinations are advisable, but otherwise it is harmless.

Glycosuria also occurs in certain pituitary disorders though in others, notably acromegaly, sugar tolerance is abnormally high.

In so-called "lag curve" glycosuria the sugar is either absorbed too quickly or stored too slowly, so for a short time it appears in the urine and the blood-sugar is high; it is often a forerunner of diabetes mellitus.

Haemochromatosis or bronzed diabetes is a familial disease affecting males almost entirely. There appears to be an inability to excrete iron, so it settles in the tissues, ultimately destroying the pancreas, making the liver cirrhotic and brick-red, and impregnating the lymph glands and most of the other tissues of the body.

Treatment is as for diabetes mellitus. Experimentally glycosuria is produced by puncture of the floor of the fourth ventricle and by phloridzin poisoning.

GOITRE

A word about the pathology will help to explain the different varieties of goitre and their treatment.

The gland responds to iodine shortage, plus some unknown factor, by increasing the number of its cells—hyperplasia; if this continues unabated the secretion increases and becomes perverted—exophthalmic goitre, Graves's disease or thyrotoxicosis.

If, as usually happens, involution occurs without excessive and toxic secretion the condition is called simple goitre. Involution can take two forms, either the cells become small and flattened and the acini enlarged, colloid goitre, or the cells increase in numbers but not in activity, so many small acini are seen, containing little or no colloid, parenchymatous goitre; there is also an increase in the fibrous tissue of the gland; this is the common variety in the hill tracts of India and can attain a great size.

Mixtures of the two, or all three, can occur, forming adenomatous, nodular or toxic adenomatous goitres. Finally, the gland may become inflamed—"woody thyroid"—carcinomatous, or occasionally tuberculous.

TREATMENT.—From the above remarks it will be deduced that an adequate intake of iodine will prevent the onset of goitre or may even cure the early stages before structural changes have occurred, and this turns out to be the case. Some years ago iodized salt was very popular, and it should certainly form an article of everybody's diet in goitrous districts.

In larger doses, iodine may be given as tincture of iodine or as Lugol's solution (iodine 1 part, potassium iodide 2 parts, water 20 parts), five drops three times a day in milk, and increased as necessary. This has a dramatic effect on a case of Graves's disease, causing symptoms and some of the swelling to disappear by the end of 10 or 14 days; this preparation should be given to all cases of Graves's disease before thyroidectomy. Unfortunately the improvement is short-lived.

Thiouracil and Methyl thiouracil.—The usual dosage is as follows:

Weeks 1-2 . . . 600 mg.—one tablet 3 times a day.
 Weeks 3-4 . . . 500 mg.—one, one, and one-half a tablet a day.
 Weeks 5-8 . . . 400 mg.—one tablet twice a day.
 Maintenance dose . . 200 mg.—one tablet a day, or less.

A few points require emphasis: improvement does not set in for several weeks; it is delayed by previous administration of iodine; the thyroid usually enlarges and becomes softer in the early weeks of treatment but later diminishes in size; finally, relapses may occur if treatment is stopped but disappear when it is resumed. Certain toxic reactions have been reported, chiefly in the form of nausea, enlarged glands and initial leucopenia; methyl thiouracil is less toxic than thiouracil, but early hopes have not been entirely realized with either drug.

After thiouracil, operation may be more difficult because of hæmorrhage and the hardness of the gland. The treatment of simple goitre is by operation if the tumour is large, unsightly, retrosternal or causing pressure; the nodular type of goitre is more likely to press on the trachea than the other types. Interference with the recurrent laryngeal nerves and consequent paralysis of one or both vocal cords suggests malignant disease.

Long-continued hyperthyroidism may cause auricular fibrillation, which can be relieved by operation or by thiouracil. Total thyroidectomy has been advocated for all cases of auricular fibrillation, but this is allowing enthusiasm to override judgment.

Many patients with goitre ultimately suffer from hypothyroidism and need the daily administration of thyroid gland or thyroxine.

GONORRHOEA—See Venereal Diseases.

GOUT

TREATMENT OF THE ACUTE ATTACK.—The patient must be put to bed, the limb raised on a pillow and protected from the weight of the bed-clothes.

One of the following local applications should be used:

R. Oleum Gaultheriæ	}	. aa 5ij	or	R. Liq Plumbi Subacet.	.. M'36
Oleum Olivæ			Tr. Opn	.. 5jss	
Liq Saponis			Aquam Dest	.. 5vj	
Tr Aconiti			Apply on well-soaked lint, cover with oiled silk and lightly bandage.		
Tr Opn					
Apply freely and cover with cotton- wool					

Diathermy is said to relieve the acute pain quickly.

Internally a good dose of calomel or blue pill should be given, followed by a saline 12 hours afterwards. Alcohol must be entirely stopped, and diet consists only of milk diluted with potash or barley water.

Colchicum given as in one of the following prescriptions usually relieves the pain, but it may be necessary to give a single dose of morphia or *ph*acetin to obtain relief.

R Tinct. Colchici ℥ 20	B Colchicine gr. $\frac{1}{70}$
Pot. Cit. gr. 40	Sacch Lact gr. $\frac{1}{2}$
Aqua. Chloroformi ad .. 3j	Ext. Nuc. Vom. gr. $\frac{1}{2}$
Every four hours until the acute symptoms subside.	Ext Hyos. gr. $\frac{1}{2}$
	Ext Gentian. q s.
	(one pill.)
	One pill every 3 or 4 hours. (Luff)

CHRONIC GOUT.—In every case of gout search should be made for a septic focus, as this may be the precipitating cause in an attack. The bowels should be regulated by mild not strong laxatives. The patient's shoes must be adjusted so that there is no undue pressure.

As regards diet all articles containing excess of nucleo-protein such as brain, kidney, liver, sweetbreads and fish-roe should be excluded, together with any food the patient has found by experience to disagree. Curries and all rich and highly spiced dishes are forbidden. As regards alcohol, beer, stout and red wines—especially port—should be avoided; if any alcohol is allowed it should be taken in the form of whisky. Plenty of fluid should be taken in the form of barley water or plain water with fruit juice or lemonade.

MEDICINAL TREATMENT.—Atophan, Quinophan or cinchophen is valuable and increases the output of uric acid in the urine, but unfortunately may cause grave and even fatal toxic symptoms; these can be avoided by allowing an interval of five days between courses of treatment, which should not last longer than 3 days, and, after all the more acute symptoms have abated, giving it on only one or two days per month.

B Atophan gr 10	B Pot. Iodid. gr. 10
Sod. Bicarb. gr 20	Pot Citrat. ʒss
For one cachet t d s. with a tumblerful of water.	Inf. Buchu ad .. ʒj
	t.d.s p.c.
B Pulv Guaiaci gr. 10	B Pot. Iodid. gr. 10
Pot. Iodid gr 10	Liq Arsenicalis ℥ 2
One cachet t d s p.c.	Tr Nuc. Vom. ℥ 2
If the guaiacum causes purging reduce the dose or add Cretae Praep 5 to 10 gr.	Inf. Gentian Co ad .. ʒj
	1 d s p.c.

GRAVEL

The commonest concretions are uric acid, and these are soluble in an alkaline medium; by giving alkalis the urine is easily rendered alkaline, and the patient at once relieved. Potassium salts are pleasanter to take and are better solvents than sodium salts. The citrate or acetate should be given in 1 or 2 drachm doses every 3 hours. Diet: Nitrogenous food should be small, and stimulants stopped.

				<i>Uric Acid Gravel</i>			
R Pot. Acetatis	.	..	gr. 30	R Lithu Cit.	..	..	gr. 5
Hexamin	..	..	gr. 8	P Mag. Borocit. Co	..	..	gr. 30
Syrup.	..	..	ʒss	Hexamin.	..	..	gr. 5
Aquam Destillatam ad	..	..	ʒj	Aquam Destillatam ad	..	..	ʒj
		t d s.				t.d.s.	
R Atophan or Novalofan 7½-gr. tablets							
2 tablets t d.s. with plenty of water.							

OXALURIA.—Oxalate of lime is insoluble in alkaline media and for such, this treatment is useless. In cases of oxaluria, magnesium salts have been given to replace some of the calcium oxalate by the corresponding magnesium compound which is much more soluble.

<i>Oxaluria, Useful Tonic in</i>		<i>Phosphatic Deposits</i>	
R Acid Nit-Hydrochlor. Dil.	℥ 10	R Acid. Hydrochlor. Dil.	℥ 15
Liq. Strychninae	.. ℥ 3	Syrup. Mori	.. ℥ 30
Spt. Chloroform	.. ℥ 5	Decoct. Hordei ad	.. ℥ j
Syrup. Zingiberis	.. ℥ ss	t d s. in a wineglassful of water.	
Aquam ad	.. ℥ j		

In a little water t d s.

GYNAECOLOGY

By LIEUT.-COLONEL V. B. GREEN-ARMYTAGE,
M.D., F.R.C.P., F.R.C.O.G., L.M.S. (Ret.)
Revised and added to by the Editor (H.W.)

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AMENORRHOEA

This is divided into three types, apparent, primary and secondary.

APPARENT AMENORRHOEA.—This is due to retention of the menses by an imperforate hymen. As a rule, the whole genital tract is affected, not only the vagina being full of blood (haematocolpos) but also the uterus (haematometra) and the tubes (haematosalpinx). The distended uterus can often be felt above the pubes. The condition would not exist if every female child were examined in babyhood.

Treatment.—This is to make a small crucial incision in the hymen and let the retained blood (which is of a tar-like consistency) escape slowly under strict asepsis. Subsequent child-bearing is unlikely.

PRIMARY AMENORRHOEA.—This is rare; it is said to be present when a girl has passed the usual age of puberty (9–15 years, in India) without menstruating; some girls develop slowly and may not begin menstruating till they reach the age of 18, but this is uncommon, especially in a warm climate.

The cause is some structural defect or glandular deficiency, the glands chiefly concerned being the pars anterior of the pituitary, the thyroid, the ovaries and occasionally the adrenals; diabetics sometimes fail to menstruate.

Diagnosis.—A complete examination is made, the pelvic examination being made preferably under an anaesthetic and per rectum rather than *per vaginam*. The general state of the patient is also taken into account, the secondary sexual characteristics being particularly observed.

Treatment.—In many cases, treatment is likely to be useless and the parents or prospective husband should be told so quite frankly. Even the greatest surgeon cannot provide a uterus for a patient who has not got one. In border-line cases when no structural defect is found, except perhaps an infantile uterus, an artificial menstrual cycle can be established by careful and persistent giving of hormones; after several months or even a year of perseverance, the artificially stimulated organs may have developed enough to maintain the normal rhythm, but more commonly the periods die away again if the hormones are stopped; however, it is worth trying if the patient's relatives can afford it. It is most essential to build up the patient's general health at the same time.

The human menstrual cycle usually is between 25 and 31 days, the Graafian follicle in the ovary rupturing fourteen days before the beginning of the next menstrual period, that is between 11 and 17 days after the beginning of the previous one (*see also Birth Control*).

Now the interesting thing is that before it ruptures, the Graafian follicle, activated by Prolan A from the pituitary, secretes one kind of hormone (oestrogen), but after the rupture the corpus luteum begins to form and is activated by Prolan B to secrete a different hormone, progesterin (Proluton, Lutocyclin).

Therefore, in trying to initiate the cycle in a non-menstruating, but otherwise fairly normal, female we imitate nature by giving oestrogen (3 doses of 50,000 units or 5 mg. at 3-day intervals) during the first half of the cycle, and progesterin during the second half, the dose being 5–10 mg. daily for 5 doses, the last dose 5 days before the expected period. In such a case the calculation is made on a 28 day basis. Prolan A and B or oral preparations may be used instead, but the latter are not so effective in this kind of case.

SECONDARY AMENORRHOEA.—This is cessation of the menses in a patient who has previously menstruated. It may be

physiological or pathological, the physiological causes being pregnancy, lactation and the menopause.

"The commonest things most commonly occur", so until it is proved otherwise, secondary amenorrhoea should be assumed to be due to pregnancy, but this assumption need not necessarily be communicated to the patient.

Pathological causes.—Certain people, probably because of a mild endocrine insufficiency, menstruate irregularly or may have no periods for several months at a time. Others may be affected by anxiety, an unpleasant experience, an operation, an illness, or by a change in climate or in height; a change from heat to cold or from the plains to the hills often being followed by temporary amenorrhoea, which may also occur when the change is in the reverse direction. Some women have an early menopause, but are perfectly healthy.

Certain diseases, such as diabetes, anaemia, hyperthyroidism, pituitary tumours, Addison's disease and mental disease are often associated with amenorrhoea, as also may be ovarian cysts.

A simple way of deciding whether in a healthy young woman a delayed period means a pregnancy or not is to give her an intra-muscular injection of Prostigmin 2 c.c. on three successive days. If the delay is due to pregnancy, nothing will happen, but if not, the period will begin. The Friedman and Aschheim-Zondek tests (*see* Obstetrics), also help.

Treatment.—The treatment of secondary amenorrhoea not due to pregnancy, lactation or the menopause, is to attend to the cause if found; otherwise, tonic and hormone treatment on the lines advocated for primary amenorrhoea will generally be successful.

CERVICAL FIBROIDS AND BROAD-LIGAMENT CYSTS

Although these tumours are not uncommon, they are always a source of anxiety during operation. Few surgeons of any large experience have not at one time or another cut or torn a displaced ureter or bladder. On one occasion on opening the abdomen I cut right into the bladder, and on another I cut away 3 in. of a very displaced ureter which I had ligated with the infundibular ligament. Provided it is realized what has happened nothing untoward will occur. The books say that the ureter can be anastomosed or that it can be implanted into the bladder, but those are very difficult and tedious procedures; personally I think the easiest and quickest method is to transplant the proximal end into the sigmoid colon on the principle of Coffey's operation, using the same technique as I have described for inoperable vesico-vaginal fistulae and ectopia vesicae. In the case recorded above this was done and recovery was uneventful. The bladder can always be sewn up with fine catgut, and invariably heals if a self-retaining catheter is inserted. In the case of large tumours, one must be prepared for and guard against shock and haemorrhage, which are very common when large retro-peritoneal areas are laid bare.

THE CERVIX UTERI

At the present moment there is only one known way to combat cancer mortality and that is by the recognition of the process in its earliest stages, or, better, to identify those lesions which are definitely known to be *forerunners of malignancy*.

The importance of this statement will be realized when the public and all practitioners remember that one out of every 27 women dies of cancer of the uterus. Now, it is a well-known fact that women who have never borne children or in whom there has never been any previous inflammatory process within the cervix, rarely develop cancer of that organ. What then is the pre-cancerous stage in a woman who has borne children? Surely it is the presence of chronic inflammation, the result of chronic irritation, this irritation being most probably of a chemical nature, just as coal-tar produces carcinoma of the scrotum, and a pre-cancerous condition of the epithelium can be produced in the skin of a rabbit by the application of coal-tar.

It has been suggested that the constant bathing of the cells of the vaginal portions of the cervix, which were intended to remain in an alkaline solution, with a purulent acid secretion is an important factor in the causation of malignancy. Nevertheless it must be remembered that *chronic inflammation and irritation is kept up by the presence of hosts of bacteria which harbour in the complicated glandular arrangement of the cervical mucous membrane, and that an erosion of the cervix is neither an ulceration nor a granuloma, but rather an adenoma.*

We do not yet know the exact cause for the proliferation of cells, previously normal, to form what we call microscopic cancer, but there seems little doubt that chemical and bacterial irritation and inflammation are the predisposing factors. Therefore, it behoves us in every case of erosion plus laceration in a parous woman over the age of 30 to insist on adequate treatment, and by that I do not mean painting with picric acid or carbolic acid, or the use of ionization and suchlike tinkering gynaecology, which prostitute the good name of our art, but rather excision, amputation or electric cauterization of the entire diseased area.

Huggins, in 2,985 cases treated on these lines during the last ten years, has never seen cancer of the cervix develop in one of these patients, and in an admirable thesis he deplures the carelessness of the gynaecologist in his responsibility to infections within the cervix, *and states that it is our duty to teach both the profession and the public that every infected cervix should be adequately treated as it carries with it the possibility of malignancy. He prophesies that the time will soon arrive when women will consult the gynaecologist once in six months just as they do their dental surgeon.*

Time and again the writer has insisted on the importance and necessity of an adequate pelvic examination with the use of a speculum in the case of all women consulting their doctor, either immediately or remotely after confinement, or abortion.

CHORION-EPITHELIOMA

Five per cent of women suffer from chorion-epithelioma after hydatidiform mole, which, though not very common in England, is of frequent occurrence in the tropics. If this condition is diagnosed, it can be operated on from below, doing a vaginal hysterectomy with ease. I have done 4 vaginal hysterectomies for chorion-epithelioma in 10 years. There is less haemorrhage and no shock, and little fear of infecting the general peritoneal cavity by this route. Three patients were alive and well one year afterwards; one died of haemoptysis six months later.

CURETTAGE OF THE UTERUS

Since the advent of hormone therapy, this is less commonly carried out than formerly, the usual indication, apart from completing an abortion, being the presence of placental remains which are causing haemorrhage. Curettage is also done after dilatation in cases of spasmodic or membranous dysmenorrhoea, and sometimes after (it must never be done before) a Rubin's test for sterility.

METHOD.—

- (a) Anaesthetize the patient.
- (b) Put her in the lithotomy position with her buttocks over the edge of the table.
- (c) Apply towels, swab out the vagina with mercurochrome or flavine solution (iodine is rather irritating) and disinfect the surrounding skin.
- (d) Do a complete vaginal examination to ascertain the size and position of the uterus and the presence or absence of abnormality of the adnexa.
- (e) Insert a lubricated speculum.
- (f) Catch the anterior lip of the cervix with a wide vulsellum forceps; it is best to get a good grip, but not too high up or the bladder may be injured; single-tooth "bullet" forceps are apt to tear out. The uterus should not be pulled down further than is necessary or the supporting ligaments may be injured, with consequent prolapse.
- (g) Pass a lubricated sound to confirm the size and position of the uterus and measure the length of the cavity. *Never push a dilator further than this, or the uterus may be perforated.*
- (h) Insert the smallest dilator and while it is in the cervix, lubricate and take the next size.
- (i) Instruct the assistant to remove the dilator from the cervix and as soon as he has done so, insert the next. This manoeuvre gives the cervix no time to contract before the next insertion.
- (j) Go on passing dilators, leaving each one in the cervix for a few moments, until distinct resistance begins to be felt. By this time the cervix is probably large enough to admit the sharp curette; if so, do not dilate any further, or there is danger of splitting the cervix and causing parametritis.

If dilatation is not enough, proceed very slowly, leaving each dilator in the cervix for about two minutes and stopping as soon as the curette can be comfortably inserted.

- (k) With the anterior lip of the curette, gently but firmly scrape the whole of the interior of the uterus from fundus to cervix.
- (l) With a piece of gauze, twisted on a Playfair's probe, swab the interior of the uterus with glycerin or with iodized phenol.
- (m) Replace and antevert the uterus.
- (n) Apply a sanitary towel and put the patient back to bed. Do not pack the vagina.

Should the uterus be perforated in a clean case by a small dilator, no harm is done, but a large dilator may cause enough haemorrhage to call for opening the abdomen and stitching up the hole. If the accident occurs in a septic or suspicious case, give vigorous chemotherapy.

DYSMENORRHOEA

There are four types: spasmodic, congestive, membranous and obstructive.

SPASMODIC DYSMENORRHOEA.—This is the common variety; it affects nulliparae, the pain usually begins with or just before the period and lasts for the first two days, it is sometimes associated with slight under-development as shown by scanty periods, conical cervix and small or cochleate uterus, and the patient is often constipated. It may begin with the first period or when menstruation has been established months or years; it may vary in intensity from month to month, thereby giving a clue to treatment. It is common among the educated and rare among the peasantry.

Treatment.—

- (a) A little psychotherapy often has an excellent effect, the patient being told that she is no worse off than most girls and that she should not give in, but continue her ordinary duties.
- (b) A hot bottle in bed and a hot bath night and morning often give great comfort.
- (c) Always treat constipation; a good laxative should be given on the three days before each period.
- (d) Aspirin and phenacetin, 5 grains of each every four hours, will relieve mild cases, or one of the synthetic antispasmodics such as Trasentin may be given. A good American remedy is benzyl benzoate, 20 drops of alcoholic solution on a lump of sugar; another remedy is the following:

R. Extr. Belladonnae Sicc.	} ½ grain of each in a cachet or capsule, re- peated as necessary.
Extr. Hyoscyami Sicc.	
Phenobarbital (Gardenal, Luminal)	

Amidopyrine (Pyramidon) is sometimes effective, but is not recommended for habitual use, because it occasionally

causes agranulocytosis. For quite a different reason, alcohol and opiates are to be strictly avoided.

- (e) Hormone therapy can be most successful; as many cases are undoubtedly due to painful spasms of the uterus caused by shortage of progestin (Lutocyclin, Proluton, etc.) an injection of 2 to 10 milligrams should be given daily on the three days before the period; the patient should be warned that this may delay the period. Alternatively, tablets may be given orally, the dose being six times that of the injection.

Some cases, especially those associated with under-development, or the rare membranous type, appear to be due to a faulty "build-up" of the endometrium, which separates with considerable pain, sometimes beginning a few days before the period. In these cases, oestrin (Oestrogen, Ovocyclin, etc.), 20,000-50,000 units, should be injected at four-day intervals after each period, three injections being given. Alternatively, a tablet of stilboestrol, 0.5-1.0 milligram, or better, 0.3 milligram Dienoestrol (B.D.H.) should be taken daily for the first 10 days after each period. Oestrin and progesterone treatment can be combined.

Male hormones, e.g., Perandren, have also been used, the dose being 10-25 milligrams 3 times a week for the fortnight before menstruation, but great care must be taken not to induce masculinity. If no real benefit is felt after four months, hormone therapy should be abandoned.

- (f) Dilatation and curettage is an old remedy which is often successful, but may have to be repeated after a year or so.
- (g) As pregnancy is the natural cure, and patients with severe dysmenorrhoea are often sterile, tubal insufflation should precede the dilatation and curettage in the case of a married or soon-to-be-married woman.
- (h) If the above measures have all failed and the patient's life is a misery, the operation of presacral neurectomy, if carried out thoroughly, is nearly always successful.
- (i) The last resort is to create an artificial menopause by radium or to perform hysterectomy.

CONGESTIVE DYSMENORRHOEA.—The usual cause of this is pelvic inflammation, the result of childbirth, abortion or operation. Other causes are uterine displacement, especially retroversion, salpingitis, pyosalpinx, chronic appendicitis (not uncommon), ovarian tumours and cysts, fibroids, constipation, pelvic adhesions, and that mysterious disease endometriosis, in which islets of endometrial tissue are scattered about the pelvis.

The pain comes on during the week before a period, is generally described as being of an aching or tearing character, and often stops as soon as the flow is free.

Treatment.—This is that of the cause and if none can be found, is symptomatic, e.g., by glycerin-ichthyol tampons, aspirin, or in the hope of overcoming an undiscoverable source, by sulphonamides or penicillin; milk injections are also sometimes useful.

MEMBRANOUS DYSMENORRHOEA.—This has already been referred to in the section on spasmodic dysmenorrhoea and can often be cured by the measures advocated there.

OBSTRUCTIVE DYSMENORRHOEA.—The cervical canal may be obstructed by tumours or atresia.

DYSPAREUNIA

A careful inquiry must be made to discover whether coitus is merely repulsive, actually painful, or both, and the site of any pain must be localized. In the first case the cause is probably psychological, in the second it is organic, and in the third the organic is likely to have caused the psychological.

PSYCHOLOGICAL CAUSES.—Owing to the maldevelopment or extreme youth of many brides, the complaint is much commoner in India than is generally realized. Furthermore it should be realized that the vast majority of women do not enjoy coitus nearly so much as men do, and a large number of educated or refined women, forgetting the mode of their own origin, look on the whole proceeding as being in rather bad taste and just a necessary evil to be borne in order to keep their husbands at home.

Again, only a small proportion of the female sex has opportunities of coitus with more than one man, and by no means all women, especially in the East, are married to the man of their choice; so while they might be perfectly happy with someone else, they consciously or unconsciously resist the husband whom fate, or a mercenary parent, has thrust upon them.

In taking the history, therefore, these considerations must be given due weight; unfortunately, such troubles are often incurable, although some unhappy wives find consolation in substitution therapy by thinking of somebody more attractive than their husband. Psychological dyspareunia often dates from early married life, the wife having been completely ignorant or the husband unduly impatient or clumsy.

A recently married young Anglo-Indian couple consulted the writer some years ago because the wife, although she loved her husband, "could not bear him to come near her". The writer suggested a pot of Vaseline and a bottle of champagne as a possible remedy. He did not see the couple for some time, but happened to pass them one day in the street, arm in arm; the wife turned round, caught the writer's eye and gave him a happy smile and a knowing wink.

VAGINISMUS is a troublesome manifestation of dyspareunia which may be so severe that the woman resembles a case of strychnine poisoning. It needs psychotherapy and usually local treatment as well; a longitudinal incision about an inch long is made at the

SIGNS.—Before rupture, the skilled examiner may, in a thin, soft-bellied woman, be able to feel a cystic lump in one or other tube, but this is rare because there are often no symptoms before rupture, so there is no examination.

After rupture, the signs vary with the extent of the hæmorrhage and the presence or absence of clotting.

Abdomen.—If there is blood all over the peritoneal cavity there will usually be some abdominal tenderness and rigidity, which may or may not be sufficiently marked to suggest a perforated viscus. There may also be shifting dullness and some distension.

If the escaped blood is localized and clotted, a boggy lump will be palpable on the affected side; the lump may be tender and the muscles over it more resistant than those on the opposite side.

Per Vaginam.—Several things may be noticed. Fullness may be felt in both fornices or there may be a boggy lump in one fornix rather behind the uterus and best felt manually; pulsation may be felt in the fornix. The cervix is slightly softened and the patient may feel pain when it is moved. The uterus is slightly enlarged, but not enough for the length of the pregnancy. There is usually some blood in the vagina. Green-Armytage points out that if a uterine cast has been passed it is a sure sign that the ovum is dead and there will be no more internal hæmorrhage; laparotomy is therefore unnecessary. He also draws attention to the value of passing a wide-bore needle through the posterior fornix into the peritoneal cavity in doubtful cases. If dark blood can be aspirated there is a ruptured ectopic, but not otherwise. This little operation must be done carefully; a speculum must be passed and the mucous membrane of the posterior fornix sterilized with iodine and the needle inserted by sight, not by feel, otherwise infection may be carried into the peritoneum.

TREATMENT.—The treatment of ectopic gestation is immediate laparotomy, during which the ovum and affected tube are removed and the peritoneum dried out; if the patient's condition is serious and a blood transfusion impossible, collect the blood from the peritoneum, filter it through six layers of sterile gauze and return it to the patient intravenously. If the patient is severely shocked and almost pulseless when first seen, immediate blood transfusion is required, but the operation should not be delayed more than any other operation for tying a bleeding artery. Failing blood transfusion, reconstituted plasma or glucose saline may be given before, during and after the operation. The patient usually picks up very quickly afterwards. Gas and oxygen is the best anaesthetic; failing this, an intravenous barbiturate and ether; spinal anaesthesia is permissible only if the blood-pressure is above 100, as otherwise it may be depressed below the fatal level.

ENDOMETRIOMA

Endometriomata are commonly met with. German authorities say that they occur in 14% of all gynaecological patients; Americans put the figure at 8·6%, whereas in India I worked it out at 10·6%. From the standpoint of major surgery an endometrioma causes

doubt, either because it is a tumour or because it forms a tubo-ovarian mass, or because it forms an obstruction in the bowel, vagina or rectum. Not long ago, in cases of the latter nature the bowel was resected or the rectum removed for what was supposed to be cancer. There may be a tubo-ovarian mass simulating that of gonorrhoea, a tumour like a fibroid, or a mass obstructing bladder, rectum, vagina or large intestine. When operating you should be able to recognize endometriomata by cysts containing chocolate-like material in the ovary (they readily burst), or by the "oeil de perdreau" (partridge eye) encasements on the surface of the omentum, uterus, adnexa, bowel or bladder with dense adhesions. If you do you will not diagnose cancer and resect bowel, bladder or rectum.

In a severe case all you need do is to remove both ovaries and, if called for, the top of the uterus, for these endometriomata depend for their growth on hormones from the ovary, and with removal of these glands (in an early case we try to conserve a portion) the tumour obstructing the vagina, bladder or bowel, atrophies and disappears.

The same result can be achieved by the correct X-ray irradiation of the ovaries, which causes atrophy.

A clinical point is that dysmenorrhoea or dyspareunia coming on relatively late, that is between the ages of thirty and forty-five, should raise the suspicion of endometriosis.

"FROZEN PELVIS"

What the Americans call "the frozen pelvis" is common in out-patient departments and examination halls. Digitally, the whole vaginal vault and the contents of the pelvis seem as if set in plaster of Paris. These cases are, of course, inoperable, and are usually of streptococcal origin. It is impossible to separate the adnexa from bowel or bladder without tearing them. The condition is really one of subacute cellulitis, and the treatment is by chemotherapy; diathermy also helps.

"GYNAECOLOGICAL REGRETS"

IMPERFORATE HYMEN: THE DANGER OF HAEMATOMETRA.—In 1911 a pretty Anglo-Indian girl, aged 13, was brought to hospital with what was considered simple haematocolpos—maturity is commonly reached at 10 in the tropics. I did the usual crucial-incision operation on the following morning; in four days' time she was dead of septic peritonitis. The necropsy demonstrated that she had not only haematocolpos, but also haematocervix, haematometra and haematosalpinx. She had been bleeding (and distending) month by month from below upwards into all those structures, and at no period had the pain been unbearable. The fluid contents in such a case after vaginal operation are a perfect medium for the growth of organisms. Scores of such cases have been since recorded, therefore let no one vaginally operate on a case of haematocolpos unless he is sure the patient has not got

haematometra or haematosalpinx. If you have any doubt (a rectal examination will help you), open the abdomen, and if haematosalpinx exists, tie off the tubes and later slit the vaginal membrane to let the menstrual fluid out; let it run out slowly without any suprapubic pressure.

MISTAKES IN PERINEORRHAPHY.—Many years ago I saw a woman who had had a colpo-perineorrhaphy done by a missionary doctor; by chance he had pricked or button-boled the rectum. In three weeks she had a recto-vaginal fistula. She was naturally indignant because it meant another operation. The accident would not have happened if that doctor had known of the old advice of Mr. Cutbbert Lockyer: "Everybody doing a perineorrhaphy, unless he is experienced, should put into the rectum a half-size Hegar's dilator, so that he can see as well as feel where the rectal wall is".

The perineum may be sewn up too tightly. Seven years ago one of my medical friends was nearly sued by a furious husband because he had done a perineorrhaphy in such a way that coitus was not possible. In America two cases are reported in which, for this reason, a surgeon was shot by an indignant husband.

Another trouble is sloughing of the perineum, which sometimes will happen even after the most careful suturing. The vascular supply is not very generous, so that if you put sutures in too tightly, or if you do not bring muscle to muscle and fascia to fascia, the perineum may slough, and so the patient will not be benefited after two or three weeks in bed.

X-RAY BURN.—Ten months ago I was summoned as a witness in a case in which a very experienced radiologist was mulcted in heavy damages. I had sent a lady to him to have X-ray treatment for pruritus which had resisted all other treatment. He applied X-rays once only, but possibly as a result of much previous medical treatment to the part, or because of an idiosyncrasy to the rays, she developed a burn many months later which had to be excised for fear of malignancy, as it would not heal.

That reminds me that a patient may develop epithelioma subsequent to pruritus which has resisted all treatment. Moreover, I have known cases of pruritus which have passed on to a condition known as kraurosis vulvae or leucoplakia, a predisposing stage to epithelioma; indeed, I have seen several cases of epithelioma of the perineum which started as pruritus. If I had appreciated that earlier in my career I should have done a Ball's operation or vulvectomy more often, and treated pruritus as a very significant symptom demanding every care in treatment and prognosis.

FENTON'S OPERATION.—Fenton's operation was devised for the ^{ndomē} with hypoplasia of the introitus which prevents coitus. You ^{that} ~~draw~~ draw the perineum half-way to the anus, and then sew up in a ^{the} ~~transverse~~ transverse direction. Once upon a time such a patient lived four miles ^{from} ~~from~~ where I did; about the seventh day she awoke in the

middle of the night bleeding severely from the hymenal artery. I was sent for, and when I arrived she had air-hunger and a pulse of 140; the haemorrhage was enormous. That artery may bleed on the night of matrimony, and it sometimes bleeds after Fenton's operation; warn the patient that at the first sign of real bleeding all that is necessary for her to do is to take a one-ounce bottle which is round, put it into the vagina and press it down on to the bleeding point. There is no need to operate or to stitch, or to put on artery forceps. The patient will then be well in a few hours. I did that in the case of the above patient.

INJURY OF THE RECTUM IN ADMINISTRATION OF AN ENEMA.—I have known a woman die of collapse subsequent to administration of an enema. She just sank away, probably because of some vasomotor upset, possibly via the vagus. On the other hand, I have seen a patient in whom, as the result of careless nursing, tremendous pararectal cellulitis and subsequent proctitis developed, the nurse having pushed the syringe nozzle through the mucous membrane of the rectum. Mr. Zachary Cope has described two cases of septic cellulitis developing after an enema nozzle had been driven through the rectal mucous membrane, and Mr. H. H. Rayner previously described three cases. Therefore make sure that a nurse giving an enema uses one with a rubber nozzle, not a vulcanite or, as was formerly employed, a bone one.

OPERATION ON BARTHOLIN'S GLAND.—I know a patient who, in a well-known hospital, developed an enormous haematoma on one side of the vulva because the surgeon, in removing a cyst of Bartholin's gland, forgot the deep pudic vessels at the bottom of the gland. If you do not suture or underpin those vessels, an enormous haematoma vulvae may develop later in the day, which, if it becomes septic, may cause death. The patient mentioned died six weeks later of sepsis, which spread up over the groin.

INGUINAL GRANULOMA MISTAKEN FOR SYPHILIS.—In out-patient departments I have seen doctors who ought to have known better run away when they have seen a case of granuloma pudendum, and say "Lock Hospital" or "V.D. Department". The ulcer looks very like chancroid; it spreads from the groin and may go right down to the perineum. Granuloma pudendum is not an uncommon disease, even in England. Sometime ago I was asked to see a soldier's wife suffering from inguinal granuloma, who had been sent home to England for anti-syphilitic treatment. Six injections of tartar emetic or Urea Stibamine clear up the condition.

SYPHILIS MISTAKEN FOR ELEPHANTIASIS.—One of the finest surgeons I have known operated on a patient for what he thought was ordinary elephantiasis, due to the *Filaria bancrofti*. He pricked his finger, and ten days later he had a chancre, and in six months he had lost the roof of his palate. Elephantiasis of the vulva may be tuberculous, it may be syphilitic or it may be streptococcal. In America they do not call these cases elephantiasis; they apply the term "syphiloma". This, in the vulva of the negress, is

very common there, and it looks exactly like the elephantiasis which you may see in the East. If you operate on a case of elephantiasis, take care of your fingers. It is least likely to be filarial.

IDIOSYNCRASY TO BONNEY'S BLUE SOLUTION.—Once I did a hysterectomy for fibroids on the wife of a banker. Following my usual routine, I loosely plugged the vagina overnight—I was operating at the usual hour in the East, 8 o'clock—with gauze soaked in Bonney's blue solution. The operation was a complete success, but next day the patient complained of a burning in the vagina. Two days later it was difficult to keep her in bed, and six days later practically the whole of the vaginal mucous wall sloughed out. It was six weeks before she could leave the nursing home. She had an idiosyncrasy for Bonney's blue. Her husband refused to pay me; in fact he wanted me to pay part of the nursing costs.

From the contraceptive point of view I have heard of another idiosyncrasy, in consequence of which a woman nearly lost all her teeth and most of her hair. She had been told to put a blue tablet into the douche liquid, a prescription containing mercury perchloride. She developed mercurial poisoning, in the same way that women occasionally develop carbolic acid poisoning.

PRURITUS FROM LUMINAL.—In certain women pruritus develops, and you cannot cure them, because they have an idiosyncrasy to luminal and other barbiturates, which they may take for purposes of sleep. Seven per cent. of women develop a "bathing-drawers" rash or pruritus from this cause. Some women habitually take these drugs to make them sleep, especially during menstruation.

THE USELESSNESS OF PAINTING THE CERVIX FOR EROSION.—Painting the cervix for erosion is a common practice, but there is no worse tinkering from a gynaecological point of view. It is almost malpraxis to paint a cervix with picric acid or other caustics. The proper treatment is by means of the electro-cautery or a modified Sturmdorf operation. This apparatus costs very little, and it cures. But no patient was ever cured by iodine, picric acid, carbolic acid or any such preparations.

MALIGNANT DISEASE MISTAKEN FOR CERVICAL POLYPUS.—One of my friends married a lady who was a medical graduate of London University. Eighteen months after marriage this lady, who was not practising, went to another doctor and said she had got a polyp; would she remove it? She removed it, and threw it into the waste-material bucket. Three months later there was another polyp there, and three or four smaller ones at the mouth of the cervix. In six months' time she had a metastasis in the cervical spine, and in eight months from the first operation she was dead.

The lesson of that case is that after removal of polypi from the cervix you should always have a section of the growth made by an expert pathologist as it may be malignant. This patient's polyp was

a sarcoma botryoides. She herself never thought to have a section taken. The growth may be an early cauliflower carcinoma or an endometrioma.

FATAL HAEMORRHAGE AFTER TRACHELORRHAPHY.

—Trachelorrhaphy is an easy operation. Once I lost a patient on whom I had done this operation. When the house surgeon went round in the evening it was noticed that the patient was restless, and so morphia was ordered for her. There was very little external bleeding. The nurse never noticed in the night that the pulse-rate was rising, and before dawn she was dead. The necropsy showed a haemorrhage extending from the broad ligament right up to the right kidney—an enormous haematoma; she had died of a simple operation. Why? Because I used catgut. Never use catgut for this operation. Many cases have been recorded of secondary haemorrhage after trachelorrhaphy, and in every one catgut was used. My case happened in 1920, and I have never since used anything but silkworm gut, which is absolutely safe for the purpose. I had to dismiss both the house surgeon and the nurse, because they ought to have detected that the pulse-rate had definitely increased, and that something wrong was happening.

STENOSIS AFTER AMPUTATION OF THE CERVIX.—

Amputation of the cervix is an operation any of you could do, but it is full of traps. I have twice been compelled to do Caesarean section on women who had had simple amputations done on the cervix by reputable surgeons in England. The patients had one enormous mass of craggy scar-tissue at the top of the vagina, and the uterus was incapable of pulling it open. I operated when both patients had been in labour some hours.

Another case was diagnosed as sloughing fibroids; she had had a previous operation. I put in a sound and struck pus; she had pyometra subsequent to amputation of the cervix.

Once I was asked to see a woman who had been diagnosed as pregnant. A year or more before she had had an amputation of the cervix and now amenorrhoea for two or three months; she was thought to be pregnant. She had a large haematometra.

How do you guard against this danger? (1) Dilate up the cervix to at least No. 12 or No. 14 before you do the operation. (2) Do not completely remove the mucous membrane of the cervix; if that membrane is removed up to the internal os, it is certain cervical stenosis will develop, which may necessitate a second serious operation. Stenosis of the cervix, in damming back the discharges of the cervix, was considered by the late Dr. Graves of Boston to be an important predisposing cause of cancer.

THE DANGER OF DILATATION OF THE CERVIX.—

Dysmenorrhoea is important from the general practitioner's point

of view. Any of you are capable of operating on a woman for dysmenorrhoea and dilating the cervix, but remember a regrettable incident which I saw recently in London, and which I have seen several times before. In these cases a surgeon, in dilating the cervix, had torn it. Remember that from 5-7% of women have *Streptococcus haemolyticus* at the top of the vagina, and if you tear the cervix of such a woman at the operation she may develop a parametritic phlegmon or cellulitis, which will give anxiety for months.

If you dilate for sterility, you should take three precautions: (1) When the patient is under the anaesthetic empty the bladder with a catheter yourself—do not take the word of a nurse; (2) pass a sound and ascertain the direction of the uterus; (3) inject 1 c.c. of Pituitrin into the paracervical tissue; this will cause the uterus to contract, and then there is little chance of your perforating the uterus with dilators—for every gynaecologist perforates the uterus once or twice a year.

THE DANGER OF PERFORATION OF THE UTERUS DURING DILATATION OF THE CERVIX.—There is no danger about perforation provided that (1) there is no sepsis; (2) you do not douche. A very capable lady doctor was dilating a princess for sterility. She did not empty the bladder, and she thought the uterus was anteverted. She dilated the uterus up with dilators without first finding out where the uterus was. It happened to be retroverted, and every dilator went through the anterior surface of the uterus, and she got up to No. 14. She then gave a lysol douche. Suddenly she realized that the douche material was not coming out, and she fainted. I was living a quarter of a mile off; a nurse dashed out and fetched me. The doctor was wringing her hands. She had put a pint of lysol solution into the peritoneal cavity to cure this patient of sterility! All I did was a posterior colpotomy with a pair of scissors, and let out the fluid, and sat the patient up in bed to aid its evacuation. A year later she had a full-term normal baby, and there was no bother. There is no danger to perforation if the case is clean and provided you do not douche.

THE DANGER OF INTRA-UTERINE DOUCHING.—Another point about douching is this. Possibly some of us in the past have been responsible for many patients being sterile for life. Before 1925 I thought I was doing my best. Up to that date, when we dilated for sterility, we always flushed the uterus out afterwards with saline. In 1925 Rubio's test came along; he proved that the tubes are normally patent at 60-80 mm. of mercury to air or CO₂. If you hold a douche can 4 ft. above the level of the patient's pelvis, water, which may have in it iodine, saline or lysol, may go into the tubes at 150-250 mm., and the result is that the solution, carrying organisms or irritants with it, may seal them, and so, after that operation, the woman has no chance of having a baby.

THE LIPIODOLOGRAM AND PATENCY OF THE TUBES.—There is an officer's wife in the hospital who is anxious to have a baby. She has already been insufflated twice elsewhere, and is

negative at 200, under an anaesthetic. So you would be inclined to say to her: "Your tubes are closed, and there is little chance of your having a baby unless you consent to an abdominal operation to see where the cause is". Today that is not the right course; what we must do first is a lipiodol test. I show you the hystero-gram of this patient I did yesterday afternoon; her tubes are positive to lipiodol. So do not give a bad prognosis until you have had a lipiodologram taken by somebody competent.

DIAGNOSTIC CURETTING.—In diagnostic curetting many mistakes are made. Any of you can do this in a cottage hospital or in a private house, but to do diagnostic curetting you must dilate sufficiently to admit one finger into the cervix and uterus. Your finger can feel whether the uterus is the seat of cancer, and it should be able to detect whether there is a projection on the inside of the uterus, which suggests the possibility of a new-growth or thinning of the uterus, or a fibroid which is sloughing. If the interior is polypoid or like the pile of a Turkey carpet, curette thoroughly and send the scrapings to a reliable pathologist, for it may be a case of metropathia haemorrhagica.

THE DANGER OF INSERTING RADIUM INTO A UTERUS CONTAINING FIBROIDS.—It is a grave error to put radium into a uterus in which there is possibly a submucous fibroid. Before doing so you should dilate up the cervix sufficiently to get your finger inside, for radium will cause sloughing, and the patient may be ill for months with haemorrhage and discharge.

ENDOMETRIOMA MISTAKEN FOR MALIGNANT DISEASE.—In 1921 I saw an important lady in India who had a tumour growing between the rectum and the vagina. It was hard and nodular. There was blood and mucus in the stools. I said to her, "I'm afraid this is serious, and I want you to see another surgeon with me". We visited a very good man indeed, and he said to the husband, "I must do a colostomy, etc., as your wife has a cancer of the rectum". When she was told this she said, "I will take mistletoe or anything else you like, but I will not have a colostomy done". Two years later I met her in England. In the meantime she had reached her menopause, and this cessation of the secretion of the sex hormones had caused the mass and her symptoms to disappear. We had not this information in 1921. These were thought to be cases of cancer and many were operated upon; many had deep X-ray therapy and were said to be cured. The radiologist still receives the credit of having cured them, but what he or the gynaecological surgeon does is to eliminate both ovaries. She got well of her endometrioma merely because when the menopause arrived the endometrioma disappeared. That case might have been a tragedy, i.e., colostomy and a living death, when all the time she had a condition Nature could cure in time. But surgical cure is easiest and best by oophorectomy and partial hysterectomy.

OPERATIONS FOR BACKACHE.—Scores of doctors see patients with backache who are at times dealt with by some stitching

operation for retroversion or retroflexion, when the cause of the backache is not in the woman's pelvis, but in her stance. Look at these skiagrams of a girl's case; she has had a Gilliam operation and someone else has stitched up her ovary. These skiagrams show the cause of her backache. The fifth lumbar left transverse process is adherent to the ilium and the back is scoliotic.

THE DANGER OF OPERATING IN PRESENCE OF A TUBO-OVARIAN MASS FOLLOWING ABORTION.—An abdominal operation on a patient who has a tubo-ovarian mass after an abortion is very dangerous. In 1925 I operated on a woman for an old double pyosalpinx. She had been treated by Prof. Taine of California for a septic abortion eight years before, and she had had several recurrences of pelvic inflammation. I kept her quiet for 6 weeks, hoping the pain and fever would subside, and then I would operate. They did subside, but I regret that in those days I did not appreciate sufficiently the fact that she had had a septic abortion in 1917. I removed bilateral small pus tubes and in doing so I had to open the broad ligament. I had to resect one ovary, and must have released into the circulation and into the peritoneum streptococci, which had lain there dormant since her abortion eight years ago. Streptococci have been known to go on living in the pelvis for 19 years. If I had paid more attention to the fact that she had had a septic abortion eight years ago I would have delayed operating upon her, and she might have been alive today. If there is a history of septic abortion and a tubo-ovarian mass, hold your hand, and give chemotherapy.

FATAL RUPTURE OF A GRAAFIAN FOLLICLE.—In 1920 I was called one evening to a Loretto Convent to see a charming child of 15, who was in bed complaining of severe pain in the shoulder. The doctor had given her morphia and she said she felt better, but the pain still continued. I did not think there was anything wrong in the abdomen; I thought she might have dengue, or acute rheumatism. At 1.30 in the morning the Mother Superior asked me to come at once. When I arrived, the patient was pale, restless, and the abdomen doughy and slightly distended. I rushed her down to hospital, and operated upon her an hour later. Her abdomen was full of blood. She had had a haematoma ovarii. The Graafian follicle had ruptured, letting loose folliculin, and one of the veins or arteries in the Graafian follicle had continued to bleed, causing an enormous intraperitoneal haemorrhage. I ought to have taken the shoulder fossa pain as an indication of abdominal trouble. I did an auto-transfusion of blood, but at 8 a.m. she died. She was under morphia, and so the primary abdominal features were obscured.

TENSION CYST OF GRAAFIAN FOLLICLE MISTAKEN FOR APPENDICITIS.—Many a girl who has periodic attacks of iliac pain is operated upon for appendical colic, or even subacute appendicitis, when in reality the ovary is to blame. When a girl complains of intermittent pain between the periods in the right, or

it may be the left iliac fossa, it is commonly due to a Graafian follicle "tension" cyst which has burst on the 13th to the 17th day after the first day of menstruation. The blood and liquor goes into the iliac fossa and causes peritonism, and the patient's symptoms may be those of subacute appendicitis. The general surgeon perhaps is called in and operates, yet the patient next month probably has a repetition of the same symptoms. An avoidable and regrettable error.

THE ERROR OF VENTRO-FIXATION FOR PROLAPSE.—Some of you are practising in the tropics. East of Suez you will still find hundreds of women who have had ventro-fixation done for prolapse, which as you know is extraordinarily common in the multiparae of the East (at least 50%). Prolapse is a hernia of the pelvic floor, and it will not be made better by fixation of the uterus to the abdominal wall. You must repair the musculo-fascial ring through which the uterus, bladder or rectum have descended. The only treatment of prolapse today is vaginal; you must do the operation from below, whether it be by the Manchester or American technique. The choice depends upon whether the patient wants more children, or cannot have more children.

LARGE OVARIAN CYSTS

In the East, these may attain enormous size, the largest the writer has removed containing four and a half gallons of fluid, but the record comes from China and is thirty gallons. These very large cysts are seldom malignant so the writer's usual procedure is first to make a small incision and if he is then satisfied that there is no malignancy he taps the cyst, which may be multilocular, and then removes the cyst through a much smaller incision than would otherwise have been necessary. Precautions are taken against leakage of fluid into the peritoneum. It is almost needless to say that when there is doubt whether fluid in the abdomen is due to a cyst or to ascites the treatment is to open the abdomen, *not* to tap it blindly.

Typically, in cases of ascites there is dullness in the flanks and resonance in the midline, the reverse of what occurs with an ovarian cyst; in tuberculous ascites, however, the fluid may be loculated and there may be resonance in the flanks, particularly on the left side; the same thing occurs in ascites due to malignant disease.

LEUCORRHOEA

This can be considered according to the four types of person it afflicts; normally these are the young, the parous, the elderly and those infected with venereal disease.

In every case a swab should be taken, and in non-virgins the cervix and vagina must be examined visually and the pelvis bimanually.

In India this is not always possible, but if permission is refused and a lady doctor cannot be obtained it may at least be possible for a nurse to take a swab and for the medical attendant to examine it.

Otherwise, give "scattergun" treatment, which in the case of a parous woman is not likely to be very successful because the cause probably lies in the cervix or the tubes, where surgery is needed.

IN THE YOUNG.—A profuse discharge of recent origin which is not gonorrhoeal is probably due to a foreign body, and clears up when this is removed. The white discharge which afflicts many girls is often a manifestation of debility, anaemia or constipation and is just an exaggeration of the natural cervical mucoid discharge which normally increases a few days before each period. Attention to any obvious cause, together with a good tonic, fresh air, good food and exercise cures these patients. In other cases it is due to vaginal hypoplasia, the treatment then being oestrogen in the form of injections of 10,000–20,000 units weekly, dienoestrol 0.3 milligram or stilboestrol, one milligram once a day, the dose being cut down or increased according to its effect on symptoms.

To take a vaginal swab in a child is often a difficult matter and a general anaesthetic may be required, but in many cases the application to the hymen of a piece of cotton-wool soaked in 10% cocaine solution is enough. A sterile, fine rubber catheter attached to a hypodermic syringe and passed gently through the hymenal orifice is the best "swab"; when it is inside the vagina, withdraw the plunger and suck some of the secretion into the catheter.

If there is redness or irritation round the clitoris, masturbation may be a contributory factor.

If a swab shows any particular organism chemotherapy may effect a cure, but local treatment in girls is to be avoided if possible.

The *Trichomonas vaginalis* is best seen in a hanging-drop preparation, in which it is recognized by its twisting, jerky movements.

Trichomonal vaginitis may affect both the married and the unmarried, and requires continued local treatment. The discharge is usually described as frothy or greenish, but it may be white; there is considerable irritation and the vaginal walls are red and easily bleed; needless to say coitus is practically impossible.

TREATMENT.—This is by local application, the most successful remedies being Picragol (containing 1% of silver picrate) (Wyeth) or Stovarsol (M & B).

Silver picrate is administered by an insufflation of the compound powder, followed every night for six nights by the insertion of a silver picrate suppository; a further insufflation is then given; if the condition is not thereby cured, or if it recurs, the course is repeated. Douches are not given as a rule, but some gynaecologists prescribe a saline douche each morning.

Stovarsol may be given as S.V.C. tablets, two being placed high up in the vagina each night, or tampons impregnated with S.V.C. or Stovarsol powder may be used instead. Treatment should be continued for two or three weeks.

The application of either drug should be intensified during a monthly period, when the disease is usually aggravated.

The giving of oestrogens often helps.

A vaginal condition similar to thrush (*Oidium albicans*) is not uncommon in India, especially among pregnant women. The best treatment is to paint the whole vagina, including the cervix, with 2% gentian violet.

Treatment by Hakims and Vaidis is often said to be successful when orthodox treatment fails; their chief remedies appear to be astringents such as alum and hamamelis, locally to the vagina and by the mouth as well.

IN PAROUS WOMEN.—Leucorrhoea is not always white; it may be mucoid or purulent. If the organism is amenable to chemotherapy this should be given, and if the *Trichomonas vaginalis* is responsible, treatment is as given above, but if the discharge comes from the cervix, radial cauterization is the treatment in mild cases and amputation of the cervix in the more severe.

If pus is seen to be pouring out of the cervix the cause is often pyosalpinx, which, by the way, is always bilateral. Treatment is chemotherapy followed by salpingectomy.

IN ELDERLY WOMEN.—Elderly women may have an atrophic vagina; in kraurosis vulvae, redness followed by atrophy affects the vestibule but not the labia; it is a manifestation of lack of oestrogen and is cured by giving 50,000 units of that substance twice a week followed after some weeks by stilboestrol or dienoestrol.

Leucoplakia affects the labia and is a pre-cancerous condition, but, like kraurosis, is amenable to oestrogen therapy.

IN VENEREAL DISEASE.—This is considered under that heading.

DOUCHING.—Although condemned by many advanced gynaecologists this does make a great many women more comfortable and diminish discharge or irritation. Powerful antiseptics do more harm than good, but Milton or Dettol, a teaspoonful to a pint of warm water is deodorizing and refreshing, and bicarbonate of soda or common salt in the same strength is bland and non-irritating; a woman wearing a pessary should douche herself every day. The Bidet, considered a hygienic or contraceptive necessity in Europe, is seldom seen outside that Continent.

MENORRHAGIA

During active menstrual life the common cause is endocrines; round about the menopause it may be endocrines, tumours or subinvolution, and after the menopause, tumours. After pregnancy the cause may be a mild infection or the presence of placental remains.

It is generally assumed that the building up of the endometrium during the first half of the menstrual cycle is controlled by oestrogen (Oestroform, Ovocylin, etc.), activated by prolactin A from the pituitary; once the Graafian follicle has ruptured, some fourteen days before the next period is due, the endometrium is prepared for an ovum or for menstruation by progestin (Lutocyclin, Proluton, etc.), activated by prolactin B from the pituitary. Other endocrine glands such as the thyroid and adrenals take a subsidiary part,

menorrhagia being a frequent accompaniment of thyroid deficiency. It is also thought that in some cases there is a deficiency of progestin, so the oestrogen-produced endometrium becomes hypertrophied, causing varying degrees of metropathia haemorrhagica (*see under Polypi*). This, however, is not the whole story, because cases of menorrhagia in young people have been cured by the giving of oestrogen, so perhaps the quality of the patient's own oestrogen may be at fault. Patients belonging to the metropathia group improve greatly on progestin, others improve on androgens, and many improve after marriage. It will be seen, therefore, that although our knowledge has advanced in the past few years it is by no means complete, so the treatment about to be advocated is partly empirical and theoretical.

TREATMENT.—Make a careful physical and pelvic examination, by the rectum in the case of a virgin. Sometimes indications of pelvic or appendicular inflammation may be found. In a middle-aged or elderly patient take the blood-pressure. Whenever possible, do a blood count, or at least a haemoglobin estimation on a blotting-paper haemoglobinometer. If anaemia is not present the menorrhagia is not very severe. Also obtain, if possible, an accurate menstrual history of the past few months.

If a definite lesion such as a fibroid, a carcinoma, a dilated cervix, a hard or enlarged uterus, an ovarian tumour, an ectopic gestation, or evidence of tubal inflammation is found, treatment is surgical.

If no cause is found, endocrine treatment, helped by ergot and calcium, probably will effect a cure.

IN A YOUNG WOMAN.—

(a) Give dienoestrol 0.1–0.3 milligram, or stilboestrol 0.5–1.0 milligram per day for 14 days from and including the first day of the "period". If haemorrhage is going on at the time the patient is first seen, count from that time.

(b) Give 10 grains of Ergota Praeparata, B.P., and 10 grains of calcium gluconate in capsules three times a day throughout the cycle.

(c) Give 10 milligrams of progestin once daily by injection or three times daily by the mouth for ten days, commencing on the 18th day from the beginning of the last period or from the beginning of treatment. Alternatively, and perhaps better, 100–200 units of prolao B may be given every other day during the same days. If the above treatment is not successful within two months, androgens (testosterone propionate) should be given, an effective dose being 25 milligrams twice a week. This treatment must not be continued for more than about 10 weeks (total dose 500 milligrams) or signs of virilism may begin to appear—a much more unwelcome thing than menorrhagia in a young woman. Androgen therapy may be followed by several months of amenorrhoea. Considerable success has followed the administration of Pitocin or Pituitrin $\frac{1}{2}$ c.c. daily for 3–4 days, the bleeding stops and the next period is often normal (Aquino).

AT OR ABOUT THE MENOPAUSE.—At this time the common cause of severe menorrhagia is a fibroid; another cause is chronic subinvolution often associated with retroversion, and a third is metropathia haemorrhagica, discussed under "Polypi" in the present section. In India, carcinoma is uncommon but must not be forgotten. Chronic metritis and fibrosis uteri do exist, but are rare, and many cases formerly so diagnosed are in reality metropathia haemorrhagica or subinvolution.

If, therefore, a slightly enlarged, hard uterus is found, endocrine treatment may be tried for a couple of months, but if it is unsuccessful or if the patient is impatient, hysterectomy, intra-uterine implantation of radium, or deep X-rays will be needed; the radium and X-rays act by creating atrophy of the ovaries with a consequent menopause.

For fibroids with a healthy cervix subtotal hysterectomy is the operation of choice. The writer admits that in giving this opinion he differs from many of his more drastic brethren who always do a total hysterectomy to remove any chance of cancer of the cervix, but this disease is rare in a reasonably healthy-looking cervix and rarer in India than in Europe. (Incidentally, it is said to be far less common among the wives of the circumcised than in those of the uncircumcised.) Further, total hysterectomy is a more difficult and sometimes more dangerous operation and it leaves a mutilated instead of a normal vagina—a point of some importance to a woman who is still on good terms with her husband. As already remarked, cancer of the cervix is rare and occurs at about the same age as fibroids.

Dilatation and Curettage is less popular than formerly because many cases of "endometritis" are now known to be due to endocrine errors, but it is always worth trying when the more scientific measures already outlined have failed, and it is the treatment of choice in all post-partum cases in which the cause is likely to be a placental polyp.

Severe haemorrhage must be stopped and one must never hesitate to perform a hysterectomy if this seems likely to be the only effective treatment, especially in the middle-aged. There have been many martyrs to science, but patients with menorrhagia should not be among them.

Finally, if the result of a pelvic examination is indefinite, make an examination under an anaesthetic; if "surgical pathology" is suspected, the patient's permission to do the appropriate operation should be obtained beforehand.

OPERATIVE RESULTS

Polak in a very interesting paper has analysed 95 deaths out of a total of 3,125 patients operated upon. He considers that the fatal issue can be attributed to one of the following causes:

- (a) Employment of the high Trendelenburg position in a patient with high blood-pressure produces cardiac embarrassment and the prolongation of this posture in patients with low blood-pressure increases the occurrence rate of shock. This information is of particular importance to us in India.

- (b) Too much surgery has been done at one sitting.
- (c) The time consumed in operating has over-reached the maximum of safety.
- (d) Forty-eight hours' rest is imperative before any major operation. This rule is frequently disregarded in India.
- (e) Patients who have been the subject of prolonged infection and have either a high or low leucocyte count, and particularly a low polymorphonuclear count, have a poor reaction to operative procedure. The optimal leucocyte count is 7 to 10 thousand, and the optimal polymorphonuclear percentage is 65 to 80.

He lays stress on the importance of every patient taking not less than three quarts of fluid (water, milk, fruit juice) per day for 2 to 3 days before operation, and considers that during this period the usual cane-sugar intake of the individual must be quadrupled. This latter statement is of interest to the writer, for he has during many years insisted on all patients about to undergo major operations taking 3 to 4 oz. of natural honey (modhu) for 5 to 7 days before operation in order to increase the liver-glycogen reserve, and inhibit the risks of acidosis and shock, and his results have justified the procedure now advocated by Professor Polak.

It is interesting to observe that 8 of the deaths recorded were due to paralytic ileus. Such ileus is due to partial obstruction, for although there may be a passage of gas from the rectum, and even bowel movement, vomiting continues and the gas tympanites quickly re-accumulates.

In such cases the pulse and temperature are not much alleviated, yet regurgitant vomiting continues and gas pains persist. The only treatment is early exploration under local anaesthesia, when it will be revealed that there is some loop of the intestine slightly adherent to the abdominal wall or to a point in the operative field. Release of this, with or without puncture enterostomy or caecostomy, will save the majority of these patients if only the surgeon has the courage to do so immediately a clinical diagnosis is made. Professor Polak is definitely against operation in the acute or subacute stages of adnexal infection. Should operation, however, become imperative because of pus formation or obstructive peritonitis, he advocates only simple drainage from above or below.

OVARIAN TUMOURS

Neoplasms of the ovary are extraordinarily common in all tropical countries, but probably in no civilized country today are tumours of the ovary of such colossal size seen as they are in India. The tragedy of such enormous growths is that as a result of delay in seeking advice, secondary malignant changes occur.

Recently, with the help of my registrar, Dr. K. Dutta, I have analysed my personal experiences of 547 cases of ovarian tumours, and have discovered that, whereas the incidence of a malignancy of such tumours in Europe is, according to Doderlein, 10%, and

Lippert, 15%, with us malignant changes occur in 21·7%. This is a very regrettable fact and should make one fully understand that in no circumstances should procrastination be countenanced once a diagnosis of ovarian tumour has been made. Moreover, apart from the question of malignancy, an operation with a negligible mortality in Europe becomes a serious matter in India when the patient is cachectic as a result of carrying an enormous tumour for months and may be for years.

There is just one practical point, however, I might mention and that is, one should suspect malignancy if there is tenderness, fixation and pain in the tumour, together with a low degree of fever and ascites.

PELVIC INFLAMMATION

Pelvic inflammatory disease is a condition which occurs in about 10% of all out-patient practice, and in about 5% of all gynaecological cases in general practice. Perhaps more than any other woman's disease, this particularly requires the exercise of what I call the three I's: Industry—and by that I mean the industry implied in taking a correct history and making certain investigations; secondly, Imagination, because unless you can imagine what is going on pathologically inside such a woman's abdomen you are never likely to be much good in the matter of treatment and prognosis. Thirdly, there is Intelligence, because without Intelligence you cannot possibly arrive at the correct diagnosis or method of treatment.

With regard to aetiology, we accept today the fact that 70% of all cases of pelvic inflammatory disease are due to gonorrhoea, i.e., to gonococcal infections; 20% are probably streptococcal, or mixed infections of streptococci, staphylococci and *B. coli*, and 10% are tuberculous.

We will consider the preponderant cases, the gonorrhoeal, first, and I want first to say that the gonococcus in the female genito-urinary tract only follows the course of mucous membrane. That was discovered by Professor Schaefer, whose experiment some of you may remember. He injected into the cellular tissue of the pelvis of many animals a pure culture of gonococci, but in no case was there any pelvic inflammatory reaction, but if he put the gonococcus into the uterus of an animal, at once a reaction was set up which spread via the Müllerian tract. It was also proved, at the same time, that the gonococcus, like man, needs oxygen; in the absence of oxygen it readily dies. The interpretation of that fact you will see shortly.

It is important for you to realize that the gonococcus can remain localized. For instance, you all must have had, in your practice, cases only of Bartholin abscess, or urethritis, or cystitis, or vaginitis and cervicitis. On the other hand, the gonococcus may spread up through the cervix to the endometrium and the tubes and remain there, the ovaries not being affected. In another type the gonococcus may pass, especially at the phase of ovulation in the menstrual cycle,

through the uterus and tubes and infect the ovaries, and then you have that most difficult condition of abscess of ovaries—both, as a rule—and of the tubes. Finally, I want you to realize that the gonococcus has, like Rip van Winkle, the capacity of re-awakening at the least risk of re-infection. It used to be thought that when such a woman's resistance to disease became lowered, or she caught what is called a chill, the so-called gonorrhoeal infection of the pelvis lit up again. That is no longer conceded; what is now believed is that the gonococci lie dormant in the cervix, uterus, tubes and ovaries; and it needs but re-infection with a fresh strain from the husband to cause a new outburst.

Now for a matter of fundamental importance from the point of view of the general practitioner. A woman may have gonorrhoeal pus tubes and pus ovaries, but have absolutely negative findings from a bacteriological point of view in the urethra, cervix and vagina. Hence the maxim: "Negative bacteriological findings in vagina, cervix and urethra do not invalidate the presence of a pure culture, possibly in the tubes". The proof of that was recently shown interestingly in this hospital. It was in the case of a girl, of whom I took cultures from the urethra, cervix and vagina, and sent them to Dr. Elworthy; he found nothing infective or specific in any of them. The following week I did a hysterectomy on her, and sent down her enormous pus tubes to Dr. Elworthy; from them he was able to grow a pure culture of gonococci, showing that a negative finding in the vagina, cervix and urethra is not necessarily against there being active gonococci in the tubes.

In most cases of the kind you will find stigmata of old gonorrhoeal infection. What are the stigmata in the vagina which you should look for? The first is what is known as the "pouting urethra"; the meatal mucous membrane is red and everted. The second are what are known as Snger's macules, the curious red small areas on the nymphae and vaginal orifice; when you see those in a woman who has pelvic inflammation you may be sure that the inflammation is of gonorrhoeal origin. The next stigma is the "bull's-eye cervix". If you look at the eye of a recently-killed bullock you will see a pale area around the bulging congested red eye, and in the cervix a similar appearance is seen, with greenish-white pus exuding from it.

Now with regard to the question of diagnosis. In a case of doubt you will first, of course, take a swab of the cervical discharge, and one from the urethra by milking it, and, if you like, also from the vagina, but always from the cervix. In the cases of suspected gonorrhoeal pus tubes you must put the speculum in and expose the cervix, and put your swab into the cervix. The second requirement is to make a bimanual examination. If you find, high up in the pelvis on each side of the uterus, an exquisitely tender banana-shaped or pear-shaped mass, discrete and apart from the body of the uterus, you may be fairly sure that they are pus tubes, and of gonorrhoeal origin. but one feature which makes the diagnosis absolutely conclusive is that in tubo-ovarian disease of gonorrhoeal

origin there is no parametritis and no inflammation of the cellular tissue (you will remember Schaefer's experiment).

At any time you may be called to a case in which an immediate diagnosis must be made between pelvic inflammation due to gonorrhoea, to appendicitis, to torsion of a tumour, to ectopic gestation or to the bursting of a "chocolate cyst"—that is a case of endometrioma. Previously we have dealt with each of those four conditions. In dealing with appendicitis we said there were certain physical signs which are, as a rule, on the right side only, and we went into the matter of Baldwin's tests, the so-called Head's hyperaesthesia tests, and Rovsing's test. There is also the test of peritonism and recto-vaginal examination.

The first Baldwin test is to press on the abdomen with one hand, then ask the patient to raise her right leg straightly. If on raising the leg she suddenly drops it, the test is positive, meaning that the inflammation round the appendix is involving the psoas muscle. In the next test the patient is lying in bed, and you rotate and abduct her right thigh, by which you must pull on the psoas muscle, and if the appendix is in the neighbourhood of that muscle she will call out as the thigh is rotated. The third Baldwin test is to lie the woman on her face and then you press the right loin, and, as you do that from behind, raise the thigh off the bed, then she will at once cry out. Head's hyperaesthesia tests we often do in the outpatient department. With a safety-pin we run down the front of the abdomen and ascertain which is the area of greatest hyperaesthesia; in most cases this is near McBurney's point, i.e., the viscero-sensory nerve supply area. The next Head test is to pick up the skin and fascia of the abdominal wall in the appendix area with your fingers, thus stretching the nerve fibres which go through the fascia into the fat, and the patient at once winces. The next is to test for rigidity of the peritoneum.

Rovsing's test is a novel one. Press deeply on the left side of the hypogastrium, thus displacing any air which is in the descending colon upwards into the transverse colon and caecum, and this may distend the inflamed caecum, causing pain. The practitioner should not find it difficult to distinguish acute appendicitis from pus tubes, but in an ectopic there is no great leucocytosis, there is no history of gonorrhoea, there is no fever, and there is usually a history of a delayed period or amenorrhoea. The pain is colicky, and is associated with much blanching and shock. Many mistakes have been made by surgeons diagnosing acute salpingitis as appendicitis, whereas if they had quietly waited, or sought the opinion of a gynaecologist, the condition would have been obvious vaginally. Torsion of a tumour is a clear-cut condition; you should be able to diagnose it because a tumour can be felt vaginally, there is no fever nor much leucocytosis, usually there is local resistance, and a mass can be felt on one or other side of the abdomen. Pus tubes are always a bilateral disease.

Endometrioma, or the bursting of a "chocolate cyst", is a recent phase of gynaecological pathology, and you would be forgiven if

you failed to diagnose it. It is the bursting of a tumour which is made up of material which looks like menstrual fluid, and that fluid is very irritating to the peritoneum. You can diagnose it only in a woman in whom you know that coitus has not recently occurred and the patient has not had any previous gonorrhoeal discharge, and when you know that she has not had children in the last five or seven years, and has suffered recently from dysmenorrhoea.

Prognosis is a very important matter. Try and remember that 90% of cases of acute pelvic inflammation subside if they are left entirely and absolutely alone; only 10% cause such symptoms as general peritonitis, with, of course, the symptoms of ileus duplex, or obstruction. When I say 90% subside if they are left alone, I mean that the acute symptoms—the fever and the pain—subside. In a large number the condition will clear up entirely, and the patient will have nothing to show in her pelvis in six months' time; indeed, a woman may have one attack of acute salpingitis of gonorrhoeal origin, which may clear up and leave no sign whatever of disease. But it will leave sterility due to blocking of the tubes. In a small percentage of cases the inflammation goes on for a considerable time, and the development of what we call hydrosalpinx occurs or chronic thickening and pain in the neighbourhood of both ovaries is felt.

There is another condition which may happen, and that is the inflammation may subside, but the uterus is left in a posture of fixed retroversion with prolapsed ovaries; such a patient may be constantly seeing her practitioner, or attending a hospital out-patient department, for menorrhagia, backache, dyspareunia or dysmenorrhoea.

Some of you may want to know in what percentage of pus tubes gonococci can be found. I can only report what I have found in my own experience. Up to the end of 1932 I had operated upon 612 patients on account of pus tubes, and found gonococci in only 12% of that number. So although the diagnosis is correct, gonococci may not be present in the pus, because Nature is able to auto-sterilize these patients; that is, their immunity is raised sufficiently to enable them to kill the gonococci *in situ*. When gonococci are long inside a pus tube, no oxygen being available for them, they die, and cannot be found by the bacteriologist. Another strange thing may happen, namely, that this gonorrhoeal pus may become invaded secondarily by *B. coli*, the presence of such organisms being notified by a foul smell. Yet these abscesses are sterile and the organisms dead. You need not fear to close an abdomen when such is the case; you will get an excellent result.

Now as to the subject of prognosis from the patient's point of view. In something like 15% of cases of acute pelvic inflammation an abscess forms in the tube or in the pelvis, which may point either in front or behind the uterus, so we say that the examining finger is the best arbiter of prognosis in all cases of pelvic peritonitis. If you feel that a patient has got an abscess in front of the uterus and there is dysuria and swelling then, in a number of cases, anterior

colpotomy is the best operation, but if there is an abscess in the pouch of Douglas behind the uterus with mucus from the rectum and a mass pointing in the vagina, posterior colpotomy is best. Many of you must have seen cases in which abscesses have burst into the rectum, into the vagina, or into the bladder; they were all cases which could have been anticipated if a diagnosis had been made in an early stage and the abscess had been drained. Colpotomy is an easy operation and I used to insist that every post-graduate should be able to do a colpotomy. These cases are very frequent and remain in hospital only a few days, though months later laparotomy may be advisable. As the life of the gonococcus is only six to twelve weeks, it is safe to operate on any woman with double pus tubes three weeks after the temperature has subsided.

By that time probably the gonococcus will have died, so there will be nothing to fear, wherever the pus may escape. It must then be decided whether to operate abdominally or vaginally. I recently looked up my statistics. In 800 consecutive hospital cases, 612 were operated upon, and of these 480 were operated upon abdominally, and 132 vaginally, that is to say, by anterior or posterior colpotomy.

Now a few words with regard to the operation. If on opening the abdomen you find that the condition is as you have diagnosed it, double pus tubes, you must remember the oldest maxim in gynaecological surgery: "locate the top of the uterus, and the tubes and the ovaries shall be delivered unto you". The first thing then that the surgeon must do is to find the top of the uterus, and after that the operation becomes easy, but if you scrabble about like a fowl in a farmyard you will not know where you are. The next point is that in gonorrhoeal pus tubes the adhesions are always very easily separated, which is the exact opposite of the streptococcal type. The experienced surgeon says, "I know it is gonorrhoeal, because I can separate the adhesions so easily", and therefore is not perturbed if pus leaks out, for he knows it will be sterile.

Try, in every case, to leave one ovary or a portion of both ovaries, because you do not want the patient to be completely menopausal after the operation. Remove the pus tubes; in some cases it is necessary to remove the uterus also, as in a case the other day the patient had an abscess at one cornu of the uterus and therefore I did a hysterectomy as well as removed one ovary and both tubes.

Another point, which is frequently neglected, is, do not forget to ventro-suspend or ventro-fix the uterus afterwards. Half the bad results of such operations are due to the fact that the surgeon forgets to ventro-fix or ventro-suspend the uterus afterwards. If he does not carry that out the uterus drops back into a raw inflamed space, and the patient returns complaining of dyspareunia, etc. A further point is, do not forget, before terminating the operation, to bring down the omentum or, as it is called, the "abdominal policeman"; it is the most important structure in the abdomen from the woman's point of view. Bring it down and put it behind the uterus.

I shall now leave the subject of pelvic inflammation due to the gonococcus to speak of pelvic inflammation due to the streptococcus

When a woman comes to you with pelvic inflammation, your first duty is to find out whether she has recently had an abortion, or an operation on her uterus, such as dilatation, curetting or possibly a criminal abortion, or it may be she has had a child in the last three or four months.

Will you try to remember the experiment of another distinguished pathologist, that of Whitehouse, who injected into the uterus of animals a pure culture of streptococci, and staphylococci, and nothing happened. Why? Because they need cellular tissue for their growth, just as the gonococcus was shown to need mucous membrane. That experiment of Whitehouse is of tremendous importance, because now we know that when a woman, after childbirth; after operation or after abortion develops a streptococcal infection, she must simultaneously have received, or had, an abrasion of some portion of her generative tract, because streptococci need a tear or a crack or abrasion of mucous membrane in order to reach cellular tissue, colonize and multiply, so setting up an intense inflammation. I call the streptococcus in the female generative tract "the Scotsman of the pelvis", because it will not die; it is very courageous and resists every form of treatment. Indeed, streptococci in pure culture have been found in the pelvis so long as 19 years after infection; they can set up acute inflammation after years and years so, if a careful history has not been taken, a laparotomy may be done, the leaves of the broad ligament may be opened and live streptococci liberated with a fatal result.

When you have a case of streptococcal infection of the tubes, the infection occurs extraperitoneally from the broad ligament, and it may pass thence into the ovary, and there set upiliary abscesses. That is the type of case commonly seen in hospitals; we have had three here recently. Such women may have an enormous cellular mass outside the peritoneum, or between the bladder and the uterus, or it may track up above Poupart's ligament, or up as far as the kidney, or down into Scarpa's triangle. Inflammation of streptococcal nature follows the course of cellular tissue. It is the cause of 90% of cases of parametritis, and 25% of these become abscesses, which it will be necessary to operate upon, either vaginally or extraperitoneally. How is it that women die within five, six or ten days after labour due to streptococcal infections? Imagine a skull, showing the ethmoid sinuses and cribriform plate and the frontal sinus. In very virulent infections of the nasal tract organisms pass up into the dura, and the patient quickly develops cerebrospinal meningitis and dies. A parallel happening occurs in the uterus; in a certain number of cases, the streptococci go straight through the tubes into the peritoneal cavity on each side, and set up a general peritonitis. The streptococci do not do harm to the tube itself, they shoot right through the tubes into the peritoneal cavity, setting up a fatal peritonitis. Fortunately such cases are rare. The most common cases we see in the out-patient department are those of parametritis of streptococcal origin. Puerperal streptococcal peritonitis is a cause of death in 25% of all cases of puerperal sepsis mortality.

How do you diagnose parametritis of streptococcal origin? First, the patient has a mass so hard that it feels like plaster of Paris, low down in the vagina, or beside and around the cervix. That mass is fixed to the pelvic wall, and the uterus cannot be differentiated from it, the uterus and the mass being one. Though these masses are hard they are not very tender, whereas a pus tube is exquisitely painful. There is usually a good deal of anaemia, and always a rise in temperature, which goes on for weeks, perhaps months; I have known a patient have an elevated temperature for 18 months with a parametric exudate and accompanying great invalidism and anaemia. But very rarely are such patients permanently sterile. She may get a parametrial exudate because the cervix has been torn, but she is not necessarily sterile, as is the gonococcal patient, because in many cases the inflammation is extraperitoneal and the fimbriated ends of the tube are not closed up.

In all these cases a full course of penicillin must be given before operation is considered, and will often make operation unnecessary.

POLYPI

These may grow from the mucous membrane or from the fibromuscular tissue of either the cervix or the body of the uterus; they may also be the remains of a placenta. Haemorrhage is the common symptom of polypi of the body of the uterus and a discharge of those growing from the cervix.

Mucous polypi of the cervix are the result of chronic endocervicitis, so the treatment is dilatation, curettage, disinfection or electrical cauterization of the cervix and possibly chemotherapy; in obstinate cases amputation of the cervix is required.

Mucous polypi of the body are part of the condition known as metropathia haemorrhagica, which is due to an over-production of oestrogen and an under-production of progesterin (Lutocyclin); treatment is to give the latter in 10 mg. doses daily for 10 days in the latter half of each menstrual cycle, or straight away if bleeding is continuous; a preliminary dilatation and curettage is often an advantage.

Fibrous polypi of the cervix are uncommon; they are easily seen and twisted off.

Fibrous polypi of the body are pedunculated submucous fibroids which may become quite big, though they are usually about the size of a golf ball. The important point about them is that they may invert the fundus of the uterus, so in removing them care must be taken not to make a hole through the fundus. Large polypi may need to be cut up, *morcellement*, before the stalk can be reached. A small polypus may cause a large haemorrhage.

Placental polypi occur within a few months of childbirth or abortion and may cause severe haemorrhage. Treatment is curettage.

Malignant polypi occur rarely.

POST-MENOPAUSAL UTERINE HAEMORRHAGE

My first real interest in post-menopausal bleeding began after a visit to Nepal in 1924. I was summoned to see a woman, aged

46, who had been bleeding excessively after a period of ten months' amenorrhoea. The clinical diagnosis was that of fibroids, but when I saw the patient the local condition did not fit in with this and I was inclined to think that a malignant ovarian tumour had invaded the pelvic peritoneum. At operation, a tumour of the left ovary was removed, but it was impossible to deal with the right ovary as it was involving the whole lateral wall of the pelvis.

Healing was uneventful and the patient was then treated by deep X-rays. Six years later I was requested to be present while Sir Frank Connor removed the gall-bladder, so that I might examine the pelvis thoroughly through the abdominal incision. This I did, but there was no sign or feeling of any growth whatever in the pelvis. Multiple sections were made of the ovary (which I had removed) in India, England and America, and the general consensus was that it was malignant, but I am inclined to think now that it was an innocent granulosa-celled tumour of the ovary.

Since then I have kept a methodical note of all cases of post-menopausal bleeding that have passed through my hands, both here and in Calcutta, dividing them from a clinical point of view into those that were due to visible or invisible causes. The visible speak for themselves and are shown in Table I as follows:

TABLE I.—VISIBLE CAUSES OF POST-MENOPAUSAL BLEEDING

Urethral caruncle (simple)	7
Urethral carcinoma	4
Vulval cancer	10
Decubital ulceration with prolapse	30
Traumatic ulceration due to pessaries, etc.	18
Granuloma pudendum	8
Tuberculous ulceration of the vagina	2
Syphilomata and/or elephantiasis	5
Vaginal carcinoma	5
Vaginal polyposis	1
Polypi of the cervix (simple)	23
Inflammatory granulomata of the cervix	1
Cancer of the cervix (primary)	23
" " " (after subtotal hysterectomy)	2
Tuberculous ulceration of the cervix	1

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One feature of this list which may excite comment is the comparative paucity of cases of cancer of the cervix. The reason for this seeming anomaly is that among the indigenous people of the tropics, maturity and child-bearing are almost synchronous events in the hospital class of patient. Indeed, among such people—since, from a religious and ethnic point of view, multiparity is the rule rather than the exception—I would go so far as to say that post-menopausal cancer of the cervix is very rare. To check this statement, in 1930—with the help of my registrar—I went through the out-patients' and in-patients' list for five years and found that out of 158 cases of cervical cancer, only 26 were in an operable stage when seen and only 15 had passed the change of life; of these, 9 were Europeans.

I have taken the menopause as a standard to mean the period of six full months after the cessation of normal catamenia.

Amongst pure Europeans, whether immigrant or domiciled, post-menopausal cancer of the cervix is not commonly seen, the reason in the former being that the wives of Europeans return to England with their husbands at about the age of 50, whereas in the case of the latter, habits of greater cleanliness as regards the genital tract and body are more universally practised in the East than they are in the West.

TABLE II — INVISIBLE CAUSES OF POST-MENOPAUSAL BLEEDING

Carcinoma of the corpus uteri	21
Sarcoma uteri	7
Fibromyomata and submucous fibroids	25
Polypi	37
Senile metropathia	7
Metropathia haemorrhagica	17
Ovarian tumours (benign)	6
" " (malignant and primary)	34
" " (malignant and secondary)	2
Arteriosclerosis (hyperpiesis)	2
Granulosa tumours	5
Tuberculosis (miliary) of uterus and adnexa	1
	<hr/> 164

This table is, to my mind, by far the more interesting of the two, in that it comprises not only cases in which an obvious tumour was palpable but also those in which doubt arose as to the probable cause and site of the bleeding, since in many of them nothing abnormal was palpable. In some the mucous membrane was grossly thickened and of the typical "Swiss cheese" pattern on section and, as expected, one could palpate the typical cystic enlargement of the ovary so well described by Wilfred Shaw and others, but in other cases one failed completely to do so.

In some the mucous membrane was perfectly smooth and atrophic, nothing coming away with the curette, the uterus being small and thin. In others, perhaps many years after the menopause, one has suddenly found a hyperplastic mucous membrane accompanied by one small single polypus at the fundus, no larger than a pea.

Why do these patients develop symptoms of bleeding or conditions of inexplicable hypertrophy of the mucous membrane, perhaps so long as from ten to fifteen years after the change of life?

To my mind, since it has been recently demonstrated that the urine of 60% of women after the menopause contains prolactin, the explanation of such bleeding must be sought in the anterior pituitary body, for how otherwise can we account for this Rip-van-Winkle-like awakening of ovarian function?

Jeffcoate and Fluhman have suggested that the hypertrophy of the anterior pituitary found at autopsy after the climacteric, is a compensatory readjustment of balance, following the gradual decrease of ovarian activity, the purpose of this revival of secretion being to stimulate the activity of the failing ovary. In favour of this

view is the experiment of Zondek, in which he stimulated and obtained follicular response in the ovaries of female rats and mice by transplanting into them hypophyseal grafts.

The problem is one of intense interest, and will not be solved until the uterus and ovaries of every case of post-menopausal bleeding without palpable cause can be placed, immediately after operation, in the hands of the biochemist for analysis and animal experimentation, because at present we are in the dark as to whether this positive prolan urine reaction is due to inability of the ovary to utilize it or to a lowered renal threshold for its excretion.

Moreover, is it not possible that gynaecologists can or could advance the work of the biochemist by trying the effect of experimental transplantation into women and animals of grafts taken from the ovaries or endometrium of such a case?

In the table are seven cases of what I have called "senile metropathia" in opposition to the more general term "senile endometritis". My reason is that in none of them was there the least macroscopic or microscopic evidence of any inflammatory condition in the uterus, nor could I detect any pathological state of the ovaries. I have here a specimen, removed recently by vaginal hysterectomy on account of bleeding, from a patient aged 56.

How is it possible to explain the undoubted fact that an organ like the uterus, after a long, latent period, can suddenly give rise to symptoms of bleeding without any ulcerative lesion of its mucosa? What sensitizes the mucous membrane of this uterus? What starts the clock of ovarian function re-ticking? Surely it must be the anterior pituitary.

Passing now to the subject of pelvic neoplasms, only a small proportion of those that are innocent cause bleeding, even though they are twisted or accompanied by inflammation. In the personal record of 547 cases of ovarian tumours which I published in 1931, 63 were in patients past the menopause; 4 of these with innocent growths and 26 with malignant growths had symptoms of uterine haemorrhage. Since then I have seen 8 more malignant and 2 more innocent ovarian tumours giving rise to this symptom. One of these was secondary to carcinoma of the large intestine, probably by way of retrograde lymphatic permeation.

My large experience of ovarian tumours confirms me in the belief that, in any case of post-menopausal bleeding where there is the slightest enlargement of the ovary or even resistance in either cul, laparotomy is called for, even though the bleeding is slight and temporary, since a large percentage of these cases are malignant, or, if not actually malignant, belong to the type of folliculomata.

To what is the bleeding due? Why are 75% of malignant tumours of the ovary bilateral? Why do so many of these patients suffer from primary sterility? The explanation must lie outside the pelvis, its anatomy and its blood and lymph supply. Zondek, Blair-Bell and Susmar have shown that malignant tumours and folliculomata of the ovary in some 18% of cases after the change of life give rise to a positive prolan reaction, and that removal of the neoplasm causes

this reaction to cease. Is it possible that an ovarian tumour in such a woman may take on the function of the original tissue, just as after thyroidectomy for cancer, metastatic tumours function like the original thyroid? The solution lies in the words of Harvey: "Study and seek out the secrets of nature by way of experiment". This we can only do in co-operation with the biochemist, for at present we do not know whether the growth stimulates the hypophysis to increased activity or whether the growth actually manufactures the hormone; or, still further, whether the increased activity of the pituitary is the cause of the malignancy and bilateral tumour formation. This aspect of malignancy, even though only confined to the genital tract, calls urgently for team work in every big hospital, between the biochemist in his animal laboratory and the surgeon in his ward and theatre, since Table II demonstrates that the percentage of malignant causes of invisible post-menopausal bleeding in an experience of ten years was 39.6%, whereas the incidence of malignancy among the visible causes was 31.4%, i.e., out of 304 visible and invisible cases of post-climacteric haemorrhage, the total incidence of malignancy works out at 35.8%, which is considerably less than that recorded by Fahmy from the Edinburgh School. Some explanation of this discrepancy is due to the fact that post-menopausal cancer of the cervix is rare in the East for the reasons that I have given, although ante-menopausal cancer of the cervix is exceedingly common.

Of the five granulosa tumours, four were innocent; one only was definitely malignant on section (the patient died four months later from metastases in the lung).

TREATMENT.—It is not my intention to deal individually with the laparotomy treatment of these patients, but I want to put in a strong plea for the vaginal-surgical—as against the radium—method of treatment in certain cases. In saying this, I feel somewhat like Daniel amongst the lions, for I fully appreciate that there are many here who, for cases of metropathia haemorrhagica and the like, prefer the application of radium after curettage.

For my own part, in all cases of metropathia, and even where polypi and submucous fibroids occupy a post-menopausal uterus which is no bigger than a nine-weeks' pregnancy, I prefer to carry out vaginal hysterectomy, which can be done in under forty-five minutes, is almost a bloodless operation, and in 99% of the cases is followed by a painless convalescence with no post-operative disabilities. Moreover, I am not at all sure that it is not, in the long run, a cheaper method of treatment as the patients are up and away between ten and fifteen days afterwards.

Up to date I have performed 329 vaginal hysterectomies with four deaths only, that is a mortality of 1.2%. In only one case (an early one) was the bladder injured. In none did secondary haemorrhage occur.

I am aware that this operation is, with many, an unpopular one, but I am quite sure that it is the ideal operation for many of

those cases of ante-menopausal and post-menopausal benign bleeding which occur in patients whose uteri, small or moderately large, are unaccompanied by adhesions of old, inflammatory, adnexal disease.

Radium, I know, has its advocates, but I consider that its disadvantages overweigh its advantages, since in some cases it fails to achieve its object, in others it gives rise to a constant discharge, causing pruritus, and in still others it manufactures in the mind of the woman or her relatives or both an obsession of cancerophobia, which many of us here have met and have been unable to counter.

PROLAPSE

There is no gynaecological condition more common in India. For a young woman who wants more children the Fothergill operation is ideal. For the middle-aged, or one who does not desire more children, the interposition operation with ligation of the tubes is best. In an old woman if the prolapse is complete and there exists no pelvic diaphragm the best results will be obtained from the Mayo-Ward operation of vaginal hysterectomy.

What are the respective merits of these operations from the point of view of the tropics? The Fothergill operation takes time—usually at least an hour—and involves the risk of shock and considerable bleeding in patients already debilitated. Moreover, occasionally a *B. coli* infection and sloughing of the sutures occur. Also I have seen out here patients who have been operated upon in England in whom the uterus has remained retroverted and a source of distress. In others, subsequent to the amputation of the cervix sterility has occurred, or in the event of conception, dystocia has resulted in a few, necessitating Caesarean section. Moreover, it is not improbable that the procidentia will recur in the event of future natural delivery.

The interposition operation is quickly performed, there is no bleeding or shock and, from the point of view of prolapse, provided a posterior colpo-perineorrhaphy is done, it is a radical cure, though perhaps, like the Bassini operation for hernia, it is not absolutely anatomical. I have done a great number of these operations and have never regretted one, though should a tumour form in the uterus removal of this organ at a future date would involve difficulties. These patients can leave hospital in 10–12 days, and are grateful, for the operation is accompanied by little after-pain as compared with the Fothergill.

The Mayo-Ward operation is usually indicated in old people and can be performed in under a half hour, which reminds me of a very useful hint. When doing any vaginal operation where bleeding may be expected, if you inject 1–2 c.c. of Pituitrin into the para-cervical tissue before making your incision, there will be almost complete anaemia and haemostasis. The Mayo-Ward vaginal hysterectomy is followed by a posterior colpo-perineorrhaphy, but should the patient be debilitated, this part of the operation can be put off for a few weeks, and be done later under Novocain.

Pessaries have no place in the treatment of prolapse, and the operations are easy for a hospital surgeon. Moreover, do not forget that prolapse is a hernia, and, like other herniae, tends to become larger as the patient grows older and musculo-fascia gets thinner.

In old patients or those who have undergone an unsuccessful hysterectomy or other operation, the writer (H.W.) has had success by combining Le Fort's operation (of denuding the front and back vaginal wall of mucous membrane and then sewing them together) with "Abyssinian circumcision", namely removal of the labia minora and stitching the raw areas together; in the writer's operation a small hole is left at the back for the escape of any vaginal or cervical secretion, and of course a small hole in front for urination.

PRURITUS (*See also Aous (Pruritus Ani).*)

Make a careful examination, both inside and out; discharges, excoriations, patches of eczema and their distribution being particularly noted; also test the urine because diabetes may be present, but not so commonly in life as in the text-books.

About or after the menopause kraurosis or leucoplakia is the likely cause and as both are amenable to oestrogen therapy this is started at once. Kraurosis affects the vestibule and labia minora, leucoplakia the labia majora and outside.

During pregnancy some irritation of the vulva is very common, and probably is attributable to congestion or, in some cases, to toxæmia. Calcium should be given and lead lotion is soothing; the patient should not stand for long periods, and the foot of the bed should be raised when she occupies it.

Trichomonal or other vaginitis (*see under Leucorrhœa*) may be a cause, as also may slight leakage of urine.

In children threadworms may be found and should always be looked for.

Among dirty people fleas, bugs or crabs (*Phthirus pubis*) may be the cause.

Eczema is treated like eczema elsewhere. In a certain number of cases no visible cause will be found, when the disease is treated on the same lines as pruritus ani, but it is always worth trying oestrogen and progestin.

RETROVERSION AND RETROFLEXION

The proportion of congenital to acquired cases is not accurately known because virgins are seldom given a pelvic examination, but when operating on young girls for other conditions the writer has often noticed that the uterus was retroverted.

The female capacity for holding her urine compared with that of the male is proverbial, but it has its drawback, because a distended bladder pushes the uterus backwards. It is the writer's opinion that retroversion is present in about one in four of the women on whom a pelvic examination is made, and that only in about one in four of these women can any symptoms be attributed to the retroversion.

The conditions commonly attributed to retroversion are backache, dysmenorrhoea, menorrhagia, bearing-down pains, dyspareunia, prolapse, constipation, sterility and abortion. Now any of these symptoms may be caused by retroversion or they may not, so it is important to get at the truth; the best way of doing this is to antevert the uterus and keep it in anteversion by means of a ring for a couple of months or so and to see if the symptoms are cured—the ring is then removed; if the symptoms were absent during its presence and return after its removal, and it is found that the uterus has gone back again, Gilliam's operation will be successful, so should be done. If the symptoms are cured by the ring and they remain cured after its removal it will generally be found that the uterus has remained anteverted, so nothing further need be done unless the patient is particularly anxious to guard against a subsequent retroversion. If the ring keeps the uterus forwards but has no effect on the symptoms, another cause must obviously be looked for. In the case of dyspareunia the cause can generally be detected by visual and vaginal examination, and if the patient jumps or says "Yes, that is the pain" as soon as the surgeon's fingers press on the retroverted fundus uteri, or prolapsed ovary, it is right to advise Gilliam's operation, because an actively married woman should not be condemned to pain or to the wearing of a ring for the rest of her life.

When the complaint is sterility the effect of tubal insufflation should always be watched before anything else is even contemplated, but where there is a history of abortion in conjunction with a retroverted uterus, operation is justified.

A difficult kind of case which is often seen is that of the woman with a history of previous abortion who is now about two months pregnant and has a retroverted uterus. Shall one try to antevert the uterus and risk causing an abortion, or shall we leave it as it is and risk an abortion happening later? The best thing to do is gently to try anteverting the uterus with the patient in the knee-hand position (not the knee-elbow position—the pelvic organs get too far away); if anteversion is easy, put in a ring and leave it till the middle of the fourth month, but if it is difficult do not persevere or use any force. In either case 10 milligrams or more of progesterone (Lutocyclin) should be given twice weekly by injection or three times daily by the mouth, vitamin E should be prescribed, and the patient warned not to stand up for any length of time.

TO ANTEVERT THE UTERUS.—Anteverting the uterus of a non-pregnant patient is generally done with her on her back, but she may be on her side, or, as in the case of an early pregnancy, in the knee-hand position.

METHOD.—

- (a) Tell the patient to empty her bladder.
- (b) With two fingers in the posterior fornix and the left hand on the abdomen press the fundus forwards and out of the hollow of the sacrum.

- (c) Open the vaginal fingers so that the index finger is in front of the cervix.
- (d) Push the fundus upwards and forwards with the middle finger and the cervix backwards with the index finger.
- (e) With both vaginal fingers push the cervix upwards and backwards into the hollow of the sacrum, at the same time trying to get the fingers of the abdominal hand behind the fundus; once this is done, all is well.
- (f) Continue pushing the cervix upwards with the vaginal fingers, and the fundus downwards with the abdominal fingers until the uterus is lying with the fundus over the pubes and lower than the cervix. Nothing less than this constitutes full anteversion.

If the above method fails, proceed as follows:

- (a) Tell the patient to empty her bladder.
- (b) With the patient in the lithotomy position, insert a speculum, which the assistant holds.
- (c) Swab the vagina and cervix if there is any secretion obscuring the cervix.
- (d) Catch the anterior lip of the cervix with a vulsellum forceps; this should cause no pain.
- (e) Remove the speculum.
- (f) Draw the cervix well down the vagina, holding the vulsellum in the left hand.
- (g) Pass the first two fingers of the right hand into the vagina behind the cervix and press the fundus uteri forward.
- (h) Hand the vulsellum forceps to the assistant, put the left hand on the patient's abdomen and try to get the fingers behind the fundus, which is being pushed forward by the vaginal fingers.
- (i) Tell the assistant to push the cervix, by means of the vulsellum, upwards and backwards into the hollow of the sacrum and try to get the abdominal fingers well behind the fundus as the uterus turns upside down.
- (j) Remove the vulsellum and confirm that the fundus uteri is over the pubes.

This method generally succeeds if there are no adhesions, but if it fails, give an anaesthetic and antevert the uterus by means of a sound, having satisfied yourself that there is no pregnancy.

PESSARIES.—The insertion of a pessary requires gentleness, plenty of lubricant and a knowledge of the fact that the perineum, not the clitoris, was made to be stretched; so the pessary is pressed backwards, not forwards, during introduction.

The pessary is inserted in the antero-posterior diameter, but when it gets inside the vagina it automatically turns through a right angle; when it is in place two things must be made certain of (1) that the upper rim is above the cervix, and (2) that the uterus is fully anteverted.

A rubber ring is easier to insert than a rigid one because it can

be laterally compressed during insertion; it is suitable for temporary wear, but after some months the rubber is affected by the vaginal secretion. The plastic or hard vulcanite pessary is more durable.

So far as shape is concerned, the modern tendency is to revert to the simple ring; even the Smith-Hodge pessary, with its liability to fall out, is being abandoned, and in young women it forms more of an obstacle to coitus than the ring.

Except in elderly women, who either refuse or are unfit for operation, a pessary should never be more than a temporary expedient.

The ring pessary is suitable for cases of retroversion, cystocele and moderate degrees of prolapse; in all these cases it works by keeping the vault of the vagina stretched, but the smallest, *not* the largest ring that will "do the needful" is the one to be chosen. A pessary does not control a rectocele. The cup and stem pessary, with a hollow stem, is used for cases of pelvic floor collapse in weakly, elderly people, but is not very common.

All patients wearing pessaries should douche themselves daily and have the pessary changed at least once in six months.

"Foreign-body vaginitis" is a definite contra-indication to the use of a pessary. One of the worst smells the writer ever encountered came from the vagina of a woman who had worn a rubber pessary, undouched and unchanged, for twenty years.

STERILITY

The types of sterility I am going to discuss are those seen every day by the busy practitioner, and in order to make my meaning clear on this point I am taking for consideration 300 consecutive cases, as they have presented themselves to me in my consulting room.

In 64 of these (21.3%), the husband was at fault.

In 50 (16.6%), no satisfactory cause could be discovered in either husband or wife after full examination.

In 45 (15%), the complaint was one-child sterility.

In 141 (47%), the fault was primarily or certainly in the woman.

Such being the case it will repay us to halt and consider each of these categories.

As regards the first, the husband may be old or he may have a history of epididymitis or syphilis, or he may be psychopathic, or unintelligent in the art of love. Such cases can easily be investigated by efficient examination of the semen in a condom. Such examination must be done within a very few hours of coitus.

Azoospermia in my experience is incurable, but I have seen excellent results following rest, mild thyroid medication, and diathermy in oligospermia. Total abstinence, and, if possible, separation of the parties for not less than three months must be a part of the treatment. Some of these cases are complicated by a very definite psychological complex; by this, I mean that due to some subconscious trauma of earlier days, which has not been ventilated, a man may develop an anxiety neurosis or inferiority complex. These cases are best dealt with by an expert psychotherapist.

However, I wish to make it quite clear that the most intimate enquiry must be made of, and about the husband, before necessarily proclaiming that the wife is the cause of the sterility, for I am afraid scores of women undergo unnecessary operations in order to bolster up the *amour-propre* of a defective husband.

In 50 cases no adequate cause could be assigned for the sterility, despite full examination of both husband and wife (including a Rubin test on the latter), but I have a feeling that a time will come in the near future when semen will be "grouped" in some way to suit a woman, just as blood is grouped for direct transfusion. For from a knowledge of the private lives of some of these patients, I know that they have had lefthanded children, or children by a former spouse.

Moreover, I feel quite sure that many of these cases are due to the prolonged use of contraceptives after marriage, for there can be no doubt that such abominations as quinine pessaries, cervical caps, etc., set up an endocervicitis, which is inimical to the passage and vitality of the spermatozoa. Indeed, I do not think the fact is sufficiently recognized that if women constantly use contraceptives during the first three years of married life, only a fractional proportion of them ever conceive. Some authorities state that only 10% of such become pregnant.

One-child sterility is very common among the people of India, and when it is remembered that 50% of Indian women and 12% of European women in India suffer from fever of some kind after delivery, such one-child sterility need not be wondered at. It may be that the perineum is so badly torn or the vagina so lax that the patient is always wet after coitus, or there may be such atresia or laceration of the cervix with ectropion and erosion that the chances of fertilization are few, but most often there is a condition of chronic metritis, that is a congested, bulky and retroverted uterus, with or without salpingo-oophoritis, and this is the fundamental cause.

The prospects of these patients are to a large extent dependent upon expert examination. For instance, the perineum or cervix may need suturing or some plastic operation.

On the other hand, if there is old inflammatory disease of the tubes, which have become completely glued and surrounded with adhesions to the ovary, no treatment for sterility *per se* will be of any avail, although, of course, operation may cure the chronic invalidism of these patients. If there is no palpable disease—by this I mean that the tubes and ovaries are not enlarged or painful, and that the only finding is a retroverted bulky uterus (probably the result of inefficient treatment, or neglect of vaginal examination three weeks after the baby was born)—there are two things which can be done:

- (1) The diagnostic per-uterine insufflation test of Rubin.
- (2) Remington Hobb's treatment.

It is possible that the first, for lack of the adequate apparatus or experience, cannot be carried out, but there is no reason whatever why any practitioner should not carry out the Hobb's treatment, which is simplicity itself, for I have records already of 11 cases in

which this treatment alone has resulted in conception at a later date—cases in which every known treatment, even including that much-abused operation of Gilliam—has been employed.

Here may I say that the general practitioner's custom of ordering glycerin and Ichthyol tampons or inserting a pessary is not only useless, but an anachronism today. The same thing may be said of the embryo gynaecologist who believes that a Gilliam operation for a retroverted uterus is the *ultima Thule* of treatment, for in these cases, as the uterus is in a state of chronic congestion or subacute inflammation, no mere restitution of its position will influence its conceptive power. For as Rubin has demonstrated, and as I have incontestably proved, if CO_2 passes with ease through the tubes without undue pressure with the uterus retroverted, there is no indication for Gilliam's operation if cure of sterility is the purpose, but, if the CO_2 does not pass easily or only passes under excessive pressure, or after first anteverting the uterus, one must presume that there is a mechanical kink or swelling of the mucous membrane of the tubes, and then Hobb's treatment before or after a Gilliam operation is astoundingly gratifying in its results.

HOBB'S TREATMENT.—The principle of this treatment is the introduction of glycerin into the uterus, which promotes exosmosis from the endometrium, that is to say there is an outpouring of lymph from the uterus, and its place is taken by fresh lymph from the circulation. Glycerin is a mild stimulant to the uterine muscle, it rehabilitates its tone and contractibility, and as it slowly percolates through the cervical canal it washes out that viscid secretion, which so often blocks the entrance.

Instruments required.—

- (1) A sponge holder.
- (2) A No. 6 soft rubber Jacques' catheter.
- (3) A bivalve speculum, or a posterior speculum and an anterior vaginal retractor.
- (4) A 10 c.c. "Record" syringe.

Technique.—No anaesthetic is necessary. The patient is placed in the lithotomy position, the vulva is cleansed as usual, and the speculum introduced. The cervix is manipulated into a central position, and cleansed with a swab-stick and iodine. The "Record" syringe is filled with pure glycerin, and the soft rubber catheter is attached to the end of the syringe. The catheter end is grasped lightly by the sponge holder, introduced into the cervix, and pushed right up to the fundus; the glycerin is then slowly injected, so that an even spread over the uterine mucosa is obtained. If the patient is in bed, the catheter is left *in situ* with gentle packing to keep it retained in the vagina, the treatment being repeated t.d.s.; if not in bed, the patient should return for treatment every day, for not less than 21 days.

In Calcutta, I find it best to ask one of the many reliable lady doctors to carry out the treatment after the first application; that is, after the patient realizes that there is no pain or disability entailed.

The patient is asked to report herself in a month, for by that time one usually finds the uterus small, mobile and no longer tender to palpation. While this treatment is being carried out, the patient is told to take $\frac{1}{2}$ gr. of thyroid extract twice a day, to rest from 12 noon to 4 p.m. on her face, with the foot of the bed raised, and to submit to some form of Plombiere treatment, that is, to douche herself rectally with hot normal saline or 1 grain of permanganate of potash to 2 pints of hot water twice a day, for many of these cases have an oedematous or varicose condition of the parametrium.

Coitus is absolutely forbidden for three months. The treatment is repeated on 15 days in the second month, 10 days in the third month. The husband is instructed to be with his wife on the 7th, 9th and 11th days after the last day of the third menstrual period, for those are the days of elective procreation, corresponding with the date of ovulation in women, which takes place between the 13th and 17th days after the first day of menstruation.

It may help to emphasize this fact if the practitioner will remind his patient that the Jews are the most prolific race in the world, and that the Mosaic law does not permit the orthodox Jew to cohabit with his wife until after the 7th day following the last day of menstruation.

Before quitting the subject of Hobb's treatment I should like to add that this treatment, so simple and efficient for drainage of the uterus, is of extraordinary value in cases of puerperal sepsis, for each application relieves congestion, lowers the temperature and alleviates pain. Moreover, it is very useful in cases of abortion with retained products of fertilization, which have become infected.

Finally, in cases of one-child sterility, in which all treatments have been tried, reference should be made to the modern treatment by diathermy. This method should only be used by an expert, but the reports of such cases as have been treated show that it is a very valuable means of restoring health to a tender, congested uterus, thereby perhaps rendering the nidus for conception normal.

FAULTS IN THE WOMAN.—From a clinical point of view, such faults can be divided into psychological, anatomical and pathological. Out of the 141 cases seen by me, 11 (7·8%) belonged to the psychological category, by which I mean that extreme frigidity or vaginismus existed. These cases are very difficult to treat, since as a rule there is no anatomical defect or cause for such reluctance.

Suggestion, mental massage or glass vaginal dilators before or after a "Fenton" operation are sometimes successful. Little can be expected of drugs such as valerian or nux vomica, for it is the art of love that is defective in the husband, the wife, or both.

Anatomical defects are in my experience very common; 63 cases (44%) had defects of the vagina, cervix, uterus or its adnexa.

Developmental errors are far more frequently causes of sterility in women than practitioners realize, and it may be that faults in development are results of dietetic errors (avitaminosis), together with endocrine failure in foetal or early life up to the age of puberty.

Gross clinical conditions, such as congenital absence or non-development of the sexual organs, or lesser ones, such as the tented vagina—that is one contracted at its vault—the snout-shaped or hutton cervix, the anteriorly or posteriorly acutely flexed cochleate uterus with small insensate ovaries or the small round pelvis, are all frequently seen.

Dysmenorrhoea is usually a symptom, and such patients often are obese below the navel, and have a failure in development of the breasts, pubic or axillary hair. Some are short, and have loose joints and large tonsils. Others have absence of the half-moons of the finger-nails, or small black moles (beauty spots) all over the body, or spaced and twisted upper lateral incisor teeth. These accessory clinical signs point to hypothyroidism or hypopituitarism.

Treatment of these cases is extremely unsatisfactory from the point of view of curing the sterility. Perchance $\frac{1}{2}$ gr. of thyroid extract twice a day, with large doses such as 10 gr. each, three times a day, of whole ovarian and pituitary extract for six to twelve weeks, may be beneficial. I have only known two of these patients to become pregnant and go to full term, although such symptoms as dysmenorrhoea, obesity and dyspareunia may be alleviated.

Pathological conditions of the pelvis existed in 67 (48%) of the whole number of cases seen by me.

A careful history will elucidate whether a patient at any time since marriage has had any inflammatory condition of infective origin which might possibly have affected the genital organs and pelvic peritoneum. For instance, 18 cases gave a history suggestive of gonococcal infection; 7 had a history of severe appendicitis and operation in the acute stages; 11 had a history of abortion followed by fever for periods from 3 days to 3 weeks; 2 were definitely tuberculous, and their pelvic findings suggested tuberculous salpingitis; 3 had had operations for extra-uterine gestation.

Pelvic examination will demonstrate morbid conditions of the urethra, Bartholin's glands, or cervix; for instance, a hypertrophied, oedematous cervix eroded and with a hull's-eye appearance points to an infective condition of the endocervix. Bimanual examination will at once give the clue by pain and tenderness as to the position and condition of the uterus, tubes and ovaries, for any inflammatory condition, old or recent, of these structures will be palpable, and should the practitioner be in doubt, a combined vaginal and rectal examination will clinch the diagnosis as to the cause of sterility.

That tubo-ovarian disease, inflammatory in origin, is extraordinarily common, both in private and in hospital practice, cannot be doubted. Among my own cases they form 12.7% of the whole, and in the Eden Hospital, Captain Dutt, the Registrar, shows that they form 13.6% of all gynaecological out-patients.

Other morbid conditions causing sterility, under the age of 28, or after three years of marriage, were ovarian and dermoid tumours, 9 in all.

But still more common in my series were neoplasms of the uterus

(17 in number), including polypi of the cervix or fibroids of the corpus uteri.

In a few patients, although the history was suggestive of infection or definite of abortion, except for a retroverted uterus and prolapsed ovaries, no other morbid condition was discoverable.

TREATMENT.—An infected cervix by itself may be cured by diathermy, or by Hobb's treatment, or if these fail, by a Sturmdorff operation, which excises the mucous membrane of the endocervix.

A tubo-ovarian mass may eventually demand operation, but such treatment is very rarely followed by conception. In connection with these operations it may not be out of place here to sound a warning against laparotomy should there be a history of a miscarriage or abortion within the year, for "puerperal" tubo-ovarian masses are in 80% of cases streptococcal in origin, and hence there is a risk of infecting the peritoneal cavity and death.

The cases which demand the greatest clinical acumen are those in which the history is indefinite, the clinical findings are negative, and in which apparently there would seem to be no reason why conception should not have occurred. It is in these patients that the value of the Rubin insufflation test gives us that hope and information which hitherto we have had no means of entertaining.

TUBAL INSUFFLATION.—In 1914 Rubin first began his experiments on insufflation, and now the technique is so perfected that the gynaecologist can use it in his consulting room as a routine method of diagnosis in cases of sterility, provided that his technique is good, that the patient is seen at a favourable time with regard to the menstrual cycle, that the cervix is healthy, and that there are no contra-indications.

The writer uses Rubin's own apparatus or that of Dr. Provis. These are both portable and inexpensive. No anaesthetic is necessary; in fact an anaesthetic should on no account be used. A vaginal examination having been made to eliminate any contra-indications, the patient is placed in the lithotomy position, a bivalve speculum is inserted, the cervix is grasped by a single pointed vulsellum, and cleansed with iodine on a probe. The cannula connected to the CO₂ apparatus is now passed into the cervix above the level of the internal os. The CO₂ cylinder is connected with a pressure gauge and the CO₂ passed through an inverted U tube in water. The gas is now turned on at a very slow rate (approximately three bubbles to the minute), and the manometer is closely observed in order to determine the point at which the pressure drops. This "pressure drop" indicates the point at which the gas is released through the tubes into the peritoneal cavity. If the tubes are patent, this is usually under 100 mm. of mercury. If the tubes are closed there is no drop, and the pressure rises steadily to 200 mm. or more. The cannula and vulsellum are then withdrawn. The patient is asked particularly as to the character and location of any pain produced, as such points are of diagnostic value. For instance, if the pain, as the pressure rises, is only in the middle line, or on one or other side

of the groin, the probabilities are that there is a block in one tube or both, as the case may be.

If the gas has run through at a pressure of 100 mm. or less, and not more than three hubbles emitted per minute (roughly 100 c.c. of CO_2), the patient is asked to sit up on the couch. Confirmatory evidence of the patency of the tubes will be then established, for she will complain of sudden pain in the right or left shoulder region, due to rising of the gas under the diaphragm. (Rubin uses a fluoroscope, which he has fitted up in his consulting room.) Such pain can be abolished by asking the patient to adopt a knee-chest position for five or ten minutes, for the CO_2 then reverts to the pelvis and is quickly absorbed.

CONTRA-INDICATIONS AND DANGERS.—There must be no evidence of pelvic infection or suppuration, no pelvic tenderness or inflammatory masses, and no fever. She must not be a patient who is suffering from cardiac, renal or pulmonary disease, nor be one of great obesity. The danger of embolism is negligible if the test is done properly. The only possible danger is an extremely rare one, namely, that of blowing pus from the tubes into the peritoneal cavity, either through the fimbriated end, or from the hursting of a tube under excessive pressure, but this should not be possible if a proper examination has been made beforehand.

CHOICE OF TIME.—The most favourable time to carry out the test is from 4 to 7 days after the cessation of menstruation, when the endometrium is flat and the uterine ostia of the tubes are not obstructed by swollen mucous membrane. Moreover, such a time is of additional importance from the fact that if the test is positive the husband can be with his wife during the following three nights with a greater chance of conception occurring.

REPETITION OF THE TEST.—If the test is negative, on no account should the patient be told that conception is impossible, for although circumstances may predispose one to think so, it may be that there has been some spasm of the tubes during the test, which has prevented the passage of the CO_2 . For that reason the test should be repeated on two or three occasions, under morphia and atropine if need be. Rubin himself states that several of his patients proved to have tubal patency on a fourth test and subsequently gave birth to normal children. Moreover, it may be that the second and third tests indicate from the symptoms of the patient that the block is at the distal end of the tube, the so-called "phimotic" tube adherent to the ovary. In such a case, laparotomy, followed by salpingostomy and removal of the thickened outer covering of the ovary, may be successful.

DEDUCTIONS.—Until recently the operation most beloved of the general practitioner for sterility was that of dilatation and curetting, with or without slitting of the posterior lip of the cervix. Should this small operation fail in its purpose, the patient usually drifted to the gynaecologist for further opinion, and if he found

the uterus retroverted some modification of Gilliam's operation, perhaps, would be performed, but, should the uterus be in its normal position—which was as likely as not—and the husband healthy, another dilatation would be done!

Nowadays, however, all such tinkering gynaecology has gone by the board, for obviously any operation on the cervix or uterus will be ineffectual if the tubes are already sealed to the passage of the ovum.

Rubin's test is therefore a diagnostic measure of the very greatest importance, so should any patient with a healthy husband, after two or three years of marriage, seek advice for sterility—provided that there are no contra-indications—an insufflation test should be done before submitting her to any operation.

Moreover, it must be remembered that this test, if positive, has also a therapeutic effect, for the observations of over twenty independent surgeons have proved that this test alone, without any other treatment whatever, has resulted in conception in over 10% of sterile patients—probably by dislodging a plug of mucus or straightening out a kink in the tubes.

If the test is negative on three or four occasions, the probabilities are very much against any chance of conception—operation or no operation. For instance, the writer has done 33 salpingostomies, and has yet to see one of these women become pregnant and this is the usual experience of most surgeons.

If the test is positive, on the other hand, any measure should be taken which may enhance the chances of fertilization. For instance, Hobbs's treatment of uterine drainage for a bulky congested uterus, a Gilliam or Sturmdorff operation, or trachelorrhaphy, or sometimes the simple operation of dilatation and curetting.

Never insert a pessary for retroverted uterus associated with sterility. In those cases in which the uterus is mobile, retroverted and the tubes are patent, but an abdominal operation is not desired, excellent results may be obtained by adopting a modification of the technique devised by the late Dr. Williamson. A T-shaped incision is made in the vagina in front of the cervix, the bladder is pushed up and the anterior peritoneal pouch opened. The anterior surface of the uterus is lightly grasped with a single pointed vulsellum and brought forward. Catgut sutures, two or three in number, are now passed horizontally from side to side through respectively the pubo-cervical fascia, the cut edges of the anterior vesical peritoneal pouch, the subperitoneal surface of the uterus one inch below the fundus and then emerge through the same structures on the opposite side. The ligatures being tied and the wound closed, the uterus is now anteverted and held forwards by a light adhesion of peritoneum which is in the nature of a vaginal suspension ligament. The writer has done this operation on a great number of occasions for prolapse of the ovary, dyspareunia or sterility. In a small proportion recurrence may occur due to faulty ligatures or faulty adhesions but in no case has abortion occurred. Eleven cases have gone to full term and had no difficulty whatever at delivery. In 5 of these,

however, the uterus had dropped backwards after the childbirth and had to be temporarily rectified by pessary. The operation is not difficult, is painless, and keeps the patient in bed only 8 to 10 days.

As regards the operation of dilatation and curetting which undoubtedly is followed occasionally by conception, it is the opinion of the writer that such success is due to four factors: (1) suggestion; (2) removal of unhealthy or callous mucous membrane; (3) relaxation of the spasm of the circular fibres of the cervix; (4) the fact that the passage of solid Hegar's dilators up to 11/14 probably forces a column of air which is in "the cylinder" of the uterus through the tubes and acts like an insufflation. This column of air possibly dislodges a plug of mucus which has been blocking the tubes hitherto, for undoubtedly slow dilatation of the cervix with Hegar's solid instruments is followed by greater success than the use of tents or of Hawkins-Ambler's hollow dilators.

From the above facts it will be seen that the diagnosis and treatment of sterility is a matter of extreme clinical importance, which demands the keenest acumen and scientific investigation before advising haphazard operations.

Therefore, in the future, let us hope we may hear less frequently, from a disappointed husband or wife, that well-known lament:

"Myself when young did eagerly frequent
 Doctor and Saint, and heard great argument
 About it and about; but evermore
 Came out by the same door as in I went".

AN EASY METHOD OF STERILIZATION *PER VAGINAM*

Every gynaecologist must perforce be something of a psychologist as he becomes involved in the problems of modern married life, with its necessity for continence or contraception. In the tropics this problem is made more pressing by poverty and sickness, and the necessity of migration to England or the hills, but these considerations should not weigh with us against the balance of conscience, equity and our oath. My opinion is that Nature must take its course provided there is no medical reason against this, but if a woman desires to have no more children then, with the written consent of her husband, there is no reason why she should not have her tubes permanently ligated as a prophylactic measure. This is an easy operation, which should be possible for any gynaecologist to perform *per vaginam*.

After making a vertical incision down the anterior wall of the vagina, the bladder is pushed up; the utero-vesical peritoneum will then be seen. It is picked up with two pairs of forceps, and made to resemble the fraenum of the tongue and is cut with scissors. The anterior surface of the uterus is then grasped with a "cat's paw" and brought down; the tube on one side is caught with a long forceps, pulled down, tied in two places, and cut. The other tube is similarly dealt with. The utero-vesical pouch can then be sutured,

and the wound closed, but what I prefer to do is to pass two interrupted catgut sutures through one side of the vaginal flap, transfixing the anterior surface of the uterus low down and enclosing the two leaves of the cut utero-vesical pouch, the sutures emerging on the other vaginal flap. When these two ligatures are tightened not only is the anterior pouch closed, but the uterus is anteverted. The vaginal incision is then sutured with continuous catgut. The patient is allowed out of bed on the fifth day and goes home on the seventh.

This operation is very satisfactory and has no complications. It is important to be sure that the tubes are ligated and cut, and are not mistaken for the round ligament. This mistake cannot be made if the tubes, which have a mesentery and are loose with a free margin, are brought down into the incision for inspection before ligation. Sometimes, when there is retroversion of the uterus, it is wise to vary the operative procedure by doing a vaginal shortening of the round ligaments, either by performing a so-called anterior Baldy-Webster operation, or by suturing each round ligament to the anterior vaginal wall.

TROPICAL AFFECTIONS OF THE VULVA

Rid your head of the idea that most affections of the genitalia are of venereal origin, for in your practice you will frequently be consulted about many distressing conditions of the vulva which have no relationship to gonorrhoea or syphilis. For instance, the genitalia are frequently the site of drug rashes and I have seen eruptions there, following quinine, potassium iodide, Veramon and phenolphthalein. Again, simple eczema is a very common condition in the tropics, especially in obese subjects. Often the surfaces weep or you will see yellowish-brown greasy-looking scales. You will of course think of diabetes but in my experience sugar in the urine is rarely found in these cases. Try therefore to eliminate any septic condition in the vagina or bowel, such as haemorrhoids, dysentery, or mycotic and epizootic infections, and remember, that despite all treatment and diet these cases are often intractable and relapse after apparent cure.

Pruritus ani similarly is one of the most devastating conditions. These patients when seen have usually had every known treatment and are suffering from secondary dermatitis as a result of scratching. When all ordinary treatments have been tried, including looking for a cause in the rectum, stools and vagina, I think the best results are obtained by the injection of Proctocaine (Allen and Hanbury) around the anus subcutaneously.

Remember that the perineum and vulvar area are particularly sensitive to X-rays, therefore such treatment should be in the hands of an expert, lest secondary dermatitis or carcinoma occur as a result of the rays. One of the most distressing of all conditions is the ano-vulval pruritus seen between the ages of 40 and 50, associated with atrophy of the epidermis and subcutaneous tissues, for a cure does not exist.

Non-venereal ulceration of the genitalia is not uncommon. I have

seen yaws, leprosy, noma and tuberculous ulcers all of which have been diagnosed as syphilitic, but the condition I want to emphasize most particularly as a source of error is granuloma inguinale, which is very common in tropical countries. Its appearance is that of progressive ulceration of the labia and perineum. Its edges are slightly raised and the skin is oedematous around the exuberant fleshy granulation tissue. It is a terrible mistake to diagnose this condition as syphilitic in origin, for the treatment is exactly the same as that of kala-azar and is attended with equally good results.

Occasionally you will see a rodent ulcer or epithelioma in the neighbourhood of the vestibule or labium which has been incorrectly diagnosed. So beware.

In out-patient departments it is not an uncommon thing for patients with an elephantoid condition of one or both labia to present themselves. Do not dismiss them all as syphilitic, for it may be caused by a streptococcal skin infection with a subsequent lymphatic block or be secondary to ulceration especially on one side of the vagina, e.g., tuberculous or malignant. In other cases it may be due to filariasis.

Finally, very occasionally you will see in young people such rare conditions as ulceration following diphtheria, typhoid, measles and kala-azar.

Herpes in the genital region, though recorded, must be very rare; I have only seen one case.

VAGINAL HYSTERECTOMY

Since 1928 I have done 136 vaginal hysterectomies with one death only, but for some reason vaginal hysterectomy is dreaded by gynaecologists in India, and yet it has a peculiar attraction for women in the tropics, who will readily face anything that can be performed from below rather than per abdomen. Doyen, the great French surgeon, used to say: "No man should call himself a gynaecologist who cannot perform a vaginal hysterectomy in private", but surgeons who are quite adept in the valleys and dales of the abdomen tremble and sweat when working anatomically *per vaginam*, for they are unable to visualize upside down. Yet there is no need to be afraid; tissues are cut, vessels are tied and fascial planes are opened exactly as in performing a complete hysterectomy from above.

In the tropics uterine fibroids are extremely frequent and make up some 10% of all operations. They are found in the multipara as often as in the nullipara, and cause much haemorrhage and invalidism. Unless in very fat or debilitated patients, they are better treated by operation than by radium, for radium has suffered the fate of every other new remedy in the tropics. It has been used indiscriminately without regard to pathology and symptoms, with the result that in some cases intense inflammatory reaction has occurred; in others, where adenomyomata existed, bleeding, growth and pain increased; in a few, sloughing, accompanied by a

stinking discharge, has continued for months. If fibroids are not bigger than a 3-months' pregnancy they can be removed vaginally in a large proportion of cases, provided the surgeon is accurate and fearless in his diagnosis and technique. In a small percentage there may be slight, old salpingitis or adhesions between the pelvic wall, but never yet have I found difficulty in separating these adhesions, or been prohibited from finishing any operation vaginally, and compelled to open the abdomen.

In my last 136 vaginal hysterectomies 56 have been performed for fibromata and 21 for ovarian menorrhagia, i.e., a form of haemorrhage associated with ovarian dysfunction in which the follicular hormone is in excess or there is absence of the corpus luteum. In 17 the operation has been connected with what I might call the "precancerous cervix", i.e., a cervix everted, hypertrophied, eroded and lacerated up to the internal os, bleeding readily at touch and causing anaemia, menorrhagia and distress for many days every month. Cancer of the cervix is astonishingly common in the tropics, and this type of cervix is the soil upon which it starts and thrives.

Three cases have been more than usually interesting in that the operations were performed for chorion-epithelioma, subsequent to hydatidiform mole. In one case a girl had twice been curetted for haemorrhage subsequent to the evacuation of a vesicular mole, and on each occasion the pathologist found no evidence of malignancy. Later she came into hospital almost exsanguine. A Zondek-Ashheim test was positive; therefore chorionic elements were present. I gave her 18 oz. of blood into the vein and did a vaginal hysterectomy the next day. She went out of hospital perfectly well and reported alive one year later. The other two cases are alive two and three years later respectively. In five cases the operation was performed for cancer in the body of the uterus, the tubes and both ovaries being removed at the same time.

In 11 cases the Mayo operation for complete prolapse was performed. The patients were all old women in whom the operation could be performed in a few minutes without bleeding or shock, compared with that of the Fothergill operation. Only once have I injured the ureter and once the bladder. You need never be afraid of haemorrhage, shock or sepsis. There are a few points of importance which I stress:

- (1) Always double ligature the uterine artery.
- (2) Always remove both the tubes, for they tend to prolapse later into the vaginal wound if you do not.
- (3) Always join the bases of the two broad ligaments so that they form an antero-posterior bridge across the pelvis, and thus prevent vaginal hernia later.
- (4) Always use stout 21-day catgut, and bring the long ends of these catgut threads through the centre of your wound to promote capillary drainage.
- (5) Be sure there is no bleeding in either fornix before closing the pelvic cavity.

- (6) Always bring down the peritoneum of the base of the bladder to the edge of your vaginal incision and suture this with interrupted ligatures to the posterior vaginal incision, leaving half an inch gap in the middle line for drainage along with the catgut threads.
- (7) Put in a self-retaining or soft rubber catheter for 48 hours.
- (8) Fill the vagina with 1 in 100 brilliant green and then plug it tightly with several strips of gauze. This is kept in for 24 hours and then removed, the patient being douched twice daily with hot saline for the next six weeks. The catgut then comes out of its own accord and the wound is healed.
- (9) My patients get out of bed on the 9th day and usually leave hospital on the 12th.

The operation is not difficult provided the pouch of Douglas and the utero-vesical pouch are opened quickly. The latter incision apparently is a hugbear to the beginner, but having made the cervical incision, if you boldly push up the bladder you will see the thin, fishbelly-like membrane of the utero-vesical pouch. Put in an anterior retractor and then cut this as if it were the fraenum of the tongue and you are in the peritoaeal cavity. From then onwards the operation is merely a matter of adroitness and anatomy. The mortality of my last 286 cases of vaginal hysterectomy was 0.7%. A majority of these patients would have never submitted to any abdominal operation. I am not in favour of radium, partly because of the expense, and partly because my experience has given me small confidence in its use.

During the period in which these 286 vaginal hysterectomies were done, 435 subtotal and 366 total hysterectomies were performed, with a combined mortality of 7.17%. Such a mortality for abdominal hysterectomy may give rise to criticism as compared with the 2-3% mortality in Great Britain, but gynaecological surgery is only in its infancy in the tropics, and India is only now entering that era which began in England with Lawson Tait and Spencer Wells. The great majority of uterine tumours that present themselves are in patients old, debilitated and grossly anaemic. Indeed at times it needs no little temerity to attempt any operation. With the passing of the purdah system and the growth of education women will demand surgery in the early rather than the late stages of disease.

VESICO-VAGINAL FISTULA

- (a) Small or medium-sized fistulae without excessive scar tissue can be repaired by separating the bladder from the vaginal mucous membrane, paring the edges and sewing them up independently. The operation is made easier if the patient is in the exaggerated lithotomy position. Unfortunately these easy fistulae are not very common. Stitch with linen or silk.
- (b) Fistulae which are difficult of access may be reached if a lateral episiotomy is done.
- (c) Large fistulae or those in which there is no likelihood of bringing the edges together without tension should be treated

by implantation of the ureter into the pelvic colon. ("Coffey No. 1" is the best and simplest method—both ureters may be implanted at one operation.) The patient should be warned beforehand about the nature of the operation. The writer was once severely reprimanded by a Rajput woman for what she considered unwarrantable interference with the course of nature.

If local repair of a fistula is to be successful, certain points require careful attention.

The first operation should have the greatest prospect of success, because each operation produces more scar tissue; the first operation, therefore, deserves great forethought and care.

No operation will be successful if there is any tension on the flaps. The patient's bladder must remain empty for a fortnight after the operation; the way to achieve this is to tie in a catheter connected with a bottle and to make the patient lie on her stomach.

Pre-operative preparation includes the giving of sulphonamides for three days, during which the patient practises lying on her stomach.

HAEMATEMESIS

The treatment of venous haemorrhage is medical, that of arterial haemorrhage is medical to begin with, but may have to be surgical. Venous haemorrhage is most commonly caused by back pressure from a cirrhotic liver, which may result from alcoholism or, in India, from chronic malaria or starvation; splenic anaemia is a rare disease, but may cause haematemesis, and back pressure from a failing heart may cause gastric oozing.

Arterial haemorrhage is almost invariably from a chronic peptic ulcer, rarely from a growth.

The history, symptoms and signs, therefore, must be considered carefully as an accurate diagnosis may be of vital importance.

MEDICAL TREATMENT.—

- (a) Put the patient to bed in the Fowler position.
- (b) Give a full dose of morphia, gr. $\frac{1}{3}$, but a quarter of a grain should be given two hours later if the patient is at all restless. Morphia not only controls the patient, but also controls the movements of the stomach.
- (c) Give a blood transfusion, preferably by the drip method, about 30 drops a minute; 15 grains of calcium gluconate in 30 c.c. of water or 20 c.c. of Calcium Sandoz may be added to a pint of blood.
- (d) By the mouth give snake venom (e.g., Stypven)—the contents of two ampoules—or half an ounce of adrenaline solution.
- (e) Give milk by the mouth, about five ounces every two hours.
- (f) The use of haemoplastic serum is debated, but the writer has often used it successfully; in one case its effect was so

marked that the patient had a coronary thrombosis a few hours later.

- (g) Coagulen Ciba, prepared from animal blood-platelets, is an excellent haemostatic which may be given by slow intravenous injection or intramuscularly.

If, in spite of these measures, the haemorrhage continues, and if a peptic ulcer appears to be the cause, operation may be the only means of saving the patient's life and it must be done before the patient is moribund, which usually means within 48 hours; as the operation may be extremely difficult it should be done by a good abdominal surgeon, and medical measures, of which morphia and blood transfusion are the most important, should be carried out for 24 hours. Operation should be considered only if the patient's condition is getting worse. The simplest operation is to open the stomach or duodenum and tie the bleeding point or the vessels supplying it; if this is impossible cauterize it or apply diathermy.

HAEMATURIA

This is a common symptom of disease of the urinary tract. It is therefore essential to diagnose both the source and cause of the haemorrhage; if a cystoscope is available pass it during the attack of bleeding, and the source of the bleeding can then be localized to the kidney or the bladder. If the latter, the cause of the haemorrhage will also be seen. If a cystoscope is not available the following localizing symptoms would point to the kidney; enlargement or tenderness of the kidney, renal colic, or smoky urine, i.e., blood and urine well mixed, long thin clots, renal cells and casts; these symptoms are most likely to be caused by stone, injury or tuberculosis. If the haematuria is symptomless the probable cause is a growth or chronic nephritis.

Symptoms pointing to the bladder would be: frequent, possibly difficult, micturition. The blood would be bright and passed either at the beginning or end of micturition, or possibly in large clots. Pain at the end of the penis or in the suprapubic region. Microscopically, bladder epithelium would be seen. The most frequent causes of these symptoms are, stone, enlarged prostate, cystitis simple or tuberculous. Symptomless haemorrhage from the bladder is generally due to a growth, benign (papilloma) or malignant. Treatment must be carried out for each of these varying conditions.

HAEMOPHILIA

This hereditary condition is due to poor formation of thrombin, is seen almost exclusively in males and is transmitted exclusively by females, who for some reason are unusually fertile.

TREATMENT.—In the case of a tooth socket or the nose, plug with Russell's Viper Venom, 1:10,000 (e.g., Styphen). In the case of a wound, stitch carefully and completely, and apply firm pressure, which must be maintained for 3 or 4 days.

In all cases give an intramuscular injection of 20 c.c. of someone

else's blood, preferably fresh, but citrated will do (Hamilton Bailey). To replace a severe loss of blood and to prevent further haemorrhage, give a blood transfusion. A blood-plasma injection also checks bleeding.

Thrombin Topical (Parke, Davis) is probably the most powerful haemostatic so far discovered; the solution should be dropped or sprayed on the previously dried bleeding surface, or the powdered thrombin may be applied. The makers do not recommend applying the preparation on swabs, because these become incorporated in the quickly forming clot, and bleeding may begin again on their removal; for a similar reason the surface should not be swabbed after haemostasis is achieved. If the above modern remedies are unobtainable, plug with adrenaline gauze or tinct. ferri perchlor. on gauze and give the injection of 20 c.c. of blood, which is always possible.

HAEMOPTYSIS

Not all cases of haemoptysis require treatment, for example in mitral stenosis it may be actually of value and should be left alone. The majority of cases are due to pulmonary tuberculosis, but it is a remarkable fact that haemorrhage is rare if open air treatment is being efficiently carried out. The patient should be recumbent but in the best position for ridding the respiratory tract of the blood. Give morphia $\frac{1}{4}$ – $\frac{1}{2}$ gr.; this calms any excitement and lessens cough, a most important consideration. If the bleeding continues a combination of mercury and opium is efficient.

B Pulv. Ipecac Co gr. 4
Hydrarg. cum Cretae gr. 1

Every three hours while bleeding continues.

A simple domestic remedy is to give sodium chloride 1–4 drachms by mouth. Amyl nitrite inhalations, or injections of emetine hydrochloride are sometimes useful. Haemostatics may be given in the form of calcium intramuscularly or intravenously and also haemoplastin as detailed under the treatment of haematemesis. In severe and recurrent cases artificial pneumothorax may be successful.

HAEMORRHAGE, CEREBRAL—See Nervous System (Hemiplegia).

HAEMORRHAGE, INTESTINAL—See Gastric and Duodenal Ulcer.

HAEMORRHAGE, INTRACRANIAL—See Head Injuries.

HAEMORRHAGE, UTERINE—See Obstetrics (Ante-partum Haemorrhage and Post-partum Haemorrhage).

HAEMORRHOIDS (See also Anus, Rectum.)

EXTERNAL PILES.—Even when not inflamed these swellings at the anal margin may cause a good deal of discomfort and itching and when inflamed and swollen compel the patient to lie up. The most effective treatment is to remove them at once—2% Novocain is injected into the base of each, the greater part of which is cut off

with very sharp scissors, the clot turned out and any hæmorrhage controlled by firm pressure of the dressing, but on no account should a ligature be applied as it would cause intense pain. If for any reason the piles cannot be operated on, the following treatment should be carried out. After defæcation the parts should be well washed and cleansed with absorbent wool and one of the two following ointments applied:

R Hydrarg. Subchlor.	..	gr. 4	R Morph. Sulph.	..	gr. 5
Ext. Opii	..	gr. 2	Ung. Belladonnæ	..	5j
Ext. Belladonnæ	..	gr. 2	Ung. Stramonii	..	5j
Lanolin	..	3ss			

For Intense Itching

R Aluminis	..	gr. 15
Camphoræ	..	gr. 12
Adipis Benzoinati	..	5j

Sedative and Anaesthetic

R Acetamidii	..	5ss
Ung. Aquæ Rosæ	..	5j

If inflamed and thrombosed with great pain and tension, incise the tumour, turn out clot, cut away margins and apply hot fomentations.

INTERNAL PILES.—

TREATMENT.—

General.—Avoid constipation or straining by giving a lubricant such as paraffin or Petrolagar.

Local.—For mild cases the application of one of the many ointments is sufficient, e.g., Chlorotone and adrenaline or Ung. Gallæ cum Opi.

Injection Treatment.—There are two methods; the injection of 1 in 20 carbolic acid in almond oil above the piles, or of quinine-urethane, sodium morrhuate, Ethamolin or 1 in 5 carbolic acid in glycenn into the pile itself. When hæmorrhage has been severe, or when the pile is specially vascular, this can be combined with the 1 in 20 carbolic in oil treatment.

Selection of cases for Injection Treatment.—The most suitable are those with uncomplicated, soft internal piles, the most striking results being obtained where the symptoms are due to a single pile, usually the right anterior (Gabriel). Piles which prolapse during defæcation but after replacement do not prolapse until the next defæcation are also suitable for injection. External piles, combined entero-external piles, and piles which cannot be kept inside the rectum require operation, not injection. Needless to say, when some other condition such as fissure, fistula or tumour is present operation is the treatment, the two conditions being dealt with at the same time.

In general, women give less satisfactory results than men, perhaps because of their habitual constipation, parturition and relatively lax pelvis. Severe cases require operation, but in many trivial cases local treatment with ointments together with the cure of constipation is all that is required. During and just after pregnancy most women have piles, but these improve with the return to normal. Young patients are subject to recurrences even after operation, so injection

or palliative treatment should always be given first and operation postponed till later, preferably after the age of 35.

Position of Piles.—There are three primary piles, two on the patient's right and one on the left, and sometimes two secondary piles, both on the left and between the primary piles. The piles are named right anterior, right posterior and left lateral.

If the reader imagines the ace of clubs laid on the patient's bottom with its stalk to the patient's right (or the surgeon's left with the patient in the lithotomy position), he can visualize and remember the situation of the primary piles (*see Fig. 17*).

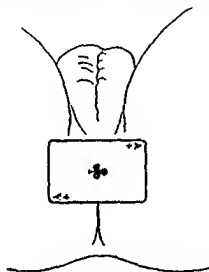


Fig. 17.—“Ace of clubs” position of primary piles.

Method of Injection (1 in 20 carbolic acid in almond oil).—

- (a) The patient's rectum should be empty, and he lies on his left side. (The stalk of the ace of clubs would thus point to the sky.)
- (b) The operator should wear a headlight or a capable assistant should hold a torch.
- (c) Insert a well-lubricated tubular speculum about 3 inches long and remove the obturator when it is in as far as it will comfortably go.
- (d) Gently withdraw the speculum until the piles come into view; decide which is the biggest one because this is the one to begin with, and remember its position.
- (e) Push the speculum gently in until it is just above the piles and instruct the assistant to hold it there exactly. With a warmed syringe inject about 3 c.c. of warmed acid. carbolic. one part in 20 parts of almond oil, which should make a painless bulge under the mucous membrane.

The writer repeats the process above the other two piles, but many surgeons prefer to inject one pile at a time allowing a week to elapse between injections. The syringe should have a long needle and preferably should be one of the special types made for the purpose with a lock-on needle; the needle of an ordinary Record syringe may suddenly become detached, because great pressure is needed to force the thick oil through, but the writer has often used it with success after fixing the needle tightly. A very fine needle is useless because the oil will not go through it.

If there is any pain either during or after the operation the injection has been made too low down.

If the piles are very oedematous and obscure the view, put the patient in the knee-elbow position; the rectum drops away from the anus and leaves a clear field of view.

Injection of a pile with sclerosing solution.—The preliminaries are the same, but in this case the injection is made actually into the pile, about 5 minims of the sclerosing solution being injected into the body of the pile and 3 minims into the base.

OPERATIVE TREATMENT.—After using the clamp and cautery for many years the writer tried the ligature operation in a few cases some years ago and was so pleased with the results (as also were the patients) that he has used it ever since. It is carried out as follows:

Anaesthetic.—A low spinal or a local is satisfactory. If a local anaesthetic is used, about 50 c.c. of $\frac{1}{2}\%$ Novocain or similar preparation are required, and the skin and submucous area should be well infiltrated. If a low spinal or a general anaesthetic is given a pleasant refinement is to inject 5–10 c.c. of Proctocain into the sphincters just before the operation; this gives a comforting analgesia for about a week or ten days and prevents painful spasm of the sphincter muscles.

Preparation.—The writer's routine is to give a dose of castor oil the morning before the operation and an enema followed by 30 minims of tinct. opii by the mouth the evening before the operation. Early on the morning of the operation a rectal wash out with normal saline is given, after which the patient sits on the latrine until all the saline has been returned, after which he is given morphia gr. $\frac{1}{4}$ with hyoscine gr. $\frac{1}{16}$ hypodermically, and 3 grains of Sodium Amytal by the mouth, the operation being done an hour or two later.

Operation.—

- (a) With the patient in the lithotomy position insert the two thumbs and stretch the sphincter. Large piles generally now prolapse.
- (b) Remembering that the stalk of the ace of clubs is on the patient's right buttock (i.e., to the surgeon's left) pick up the three primary piles with short artery forceps and draw them out of the anus.
- (c) Insert the left forefinger into the anus, stretch the base of

the left lateral pile over it, holding the forceps in the left hand.

- (d) With a pair of scissors make a V-shaped cut at the base of the pile, the point of the V facing outwards and the cut being at the muco-cutaneous junction (see Fig. 18).

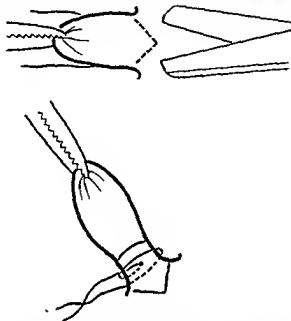


Fig. 18 —Excision and ligature operation for piles.

- (e) With a piece of gauze on the right forefinger separate off any fibres of the sphincter muscle that may be attached to the pile. (This prevents the inclusion of the sphincter in the ligature and therefore prevents a common cause of pain.)
- (f) Pass a round needle armed with stout catgut through the base of the pile, encircle it with the catgut and tie tightly (see Fig. 18).
- (g) In the case of a large pile cut off the redundant tissue about $\frac{3}{4}$ inch distal to the ligature, always leaving enough tissue to prevent slipping of the ligature. A small pile may be left to slough off.
- (h) Treat the other piles in a similar way.
- (i) Insert into the anus a piece of rubber tube wrapped in Cibazol ointment gauze and with a safety pin through the lower end; apply a pad and send the patient back to bed.

After-treatment.—Remove the tube, but not the gauze, the next day, and on the third evening give a dose of Pulv. Glycyrrhizae Co., cascara, or Cascara Evacuant with one ounce of liquid paraffin. The following morning give a warm enema of equal parts of olive

- (d) Excise any lustreless, sloughing tendon, but anchor the proximal healthy end by means of a stitch. There are two reasons for this—it prevents an infected tendon from retreating into and therefore infecting a previously healthy area, and it improves subsequent function.
- (e) Drain for at least 48 hours with glove rubber or Cibazol ointment gauze.
- (f) Give chemotherapy.

Infection most commonly spreads into the palm from a tendon sheath, but it may also occur from a direct wound or, more rarely, from osteomyelitis or pyaemia.

TENDON SHEATH INFECTION.—This is shown by a tense tender swelling over the tendon sheath, often most marked in the middle phalanx, with pain on active or passive movements of the affected tendon.

Treatment—This is by early incision, otherwise the tension and inflammation cause sloughing of the tendon and, in the case of the thumb and little finger, infection of the bursae in the palm. Incision is made to one side (see Fig. 21) to avoid hernia of the tendon, but not too far back or the digital artery will be cut. Whenever possible avoid cutting the sheath at the finger crease because an incision here is apt to be followed by adhesion or hernia of the tendon.

Even when an inflamed tendon recovers it is apt to stick in its containing sheath, so as soon as the acute stage is passed active movements should be begun and persevered with. In old cases with adhesions the writer has had some success from opening up the sheath, freeing the tendon and wrapping it in sterile amniotic membrane.



Fig. 20.—Tendon sheaths and palmar bursae.

INFECTION OF THE PALMAR BURSAE.—

ULNAR BURSA.—As will be seen from Figure 20, the flexor tendon sheath of the little finger communicates with the ulnar bursa, so infection of this sheath is likely to spread into the bursa, which sometimes communicates with the radial bursa.

Symptoms are pain on movement of the finger, with swelling and tenderness on the ulnar side of the palm.

Treatment is incision over the point of maximal tenderness in the position shown in Figure 21.

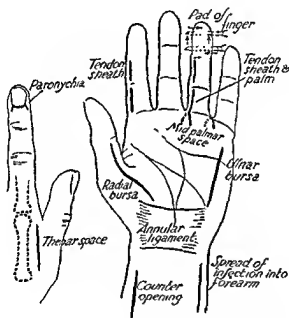


Fig. 21.—Incisions for various hand and finger infections

RADIAL BURSA.—This has been dignified by this rather unnecessary name, for it is merely the sheath of the flexor longus pollicis tendon, which happens to extend up into the palm and sometimes communicates with the ulnar bursa.

Symptoms are pain on moving the thumb, with swelling on the palmar surface of the proximal phalanx, becoming more marked as the annular ligament is reached.

Treatment is incision along the course of the flexor longus pollicis tendon, as shown in Figure 21.

FOREARM INFECTION.—The proximal parts of the palmar hursa are of interest and importance because they are the weakest part of the sacs, and they extend in front of the wrist joint to end over the lower end of the radius and ulna, lying between the pronator quadratus and the deep flexors. The result is that if an abscess in either of them hursts into the forearm the pus lies deep to all the flexors, and is best drained by an incision at the side of the forearm, as shown in Figure 21.

KANAVEL'S SPACES (see Figures 22 and 23).—Between the flexor tendon sheaths and the third, fourth and fifth metacarpals lies the mid-palmar space and between the flexors of the index finger and the adductor pollicis muscle lies the thenar space bounded on the radial side by the flexor longus pollicis tendon sheath and on the ulnar side by the fibrous septum separating it from the mid-palmar space. Reference to the diagrammatic sectional view of the hand will show how easily these spaces can become infected from the adjacent tendon sheaths.

Symptoms.—The chief symptom is a boggy swelling of the hand without any localized point of tenderness; a characteristic feature is that the swelling obliterates the normal hollow of the hand; in some cases, the swelling may be very great. There is also, as with all infections of the palm, marked oedema on the dorsum of the hand, but the mistake must not be made of thinking that the pus is there too.

Treatment.—Pus in the mid-palmar space tends to track along the course of the lumbrical muscles, and is best evacuated through the web between the 3rd and 4th or the 4th and 5th fingers (see Fig. 21).

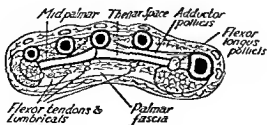


Fig. 22.—Diagrammatic section to show position of Kanavel's spaces.

Pus in the thenar space is best evacuated through an incision on the dorsum of the hand between the thumb and index finger (see Fig. 21), the artery forceps being pushed towards the ulnar side in

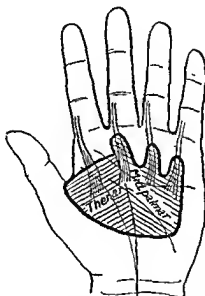


Fig. 23 —Kanavel's spaces and lumbrical muscles.

front of the second metacarpal. Incisions through the palm of the hand are unsuitable because they may have to go through (and thereby infect) the palmar bursae or cut nerves and arteries to the fingers.

INFECTION OF THE BACK OF THE HAND.—This is often diagnosed and even operated on when not present. The tissues on the back of the hand are lax, so oedema occurs there when the inflammation is in the palm (compare the oedema of the eyelids caused by a boil on the forehead). When pus is present on the back of the hand tenderness, tenseness and fluctuation are present too, so incision and drainage are required.

HAY FEVER (*See also Allergy.*)

The ideal treatment is to discover the cause and either remove the patient from it or it from the patient. Alternatively, attempts should be made to immunize the patient against it. The condition is diagnosed by the fact that the typical sneezing, rhinorrhoea and conjunctivitis occur at definite seasons of the year.

In England the season is from the middle of May till the end of July, when the pollen cloud of the ordinary Timothy grass floats over the countryside. In India the worst time is during the monsoon; pollen is apt to be caught by standing water, so patients are made much worse by bathing in it.

Often the season at which the symptoms appear gives a clue to the cause, which in India is commonly grass pollen during the warm weather and pollen from flowers, particularly Cosmos, during the cold weather; in this case the patient naturally should avoid the known cause as much as possible and should also be immunized against it.

Messrs. Parke, Davis make pollaccines against most of the common causes; the immunization should be begun about six weeks before the expected onset. Another product of the same firm is Hapamine, which can be used with success in many allergic diseases, and a further one is Benadryl.

It is obvious that floating pollen particles are liable to stick to the exposed moist surface of the body, so bathing the eyes once or twice daily with boric lotion and gently washing the nose out with normal saline are simple and valuable remedies because of their mechanical action in washing away the offending pollen.

If any obvious pathological condition of the nose is present it is, of course, corrected.

TREATMENT OF AN ATTACK.—

The staple remedies are adrenaline, ephedrine and calcium. Adrenaline may be given by injection, preferably in oil or as Hyperdure Adrenaline (A. & H.) because the effect lasts for 8-12 hours. A nasal spray containing adrenaline also brings great relief, or the drug may be dropped into the eyes.

There are many good proprietary nasal sprays, the basis of most of them being ephedrine with aromatic oils in an oily medium. A good oily nasal spray is the following:

R Ephedrinae Hydrochlor.	..	..	..	gr. 5
Adrenaline in oil	..	..	..	2 c.c.
Menthol.	..	..	..	gr. 10
Ol. Eucalypti	..	..	..	℥ 10
Paraffin. Liquid. ad	..	..	..	3j

And a watery one:

R Ephedrinae Hydrochlor.	..	..	..	gr. 5
Liquor. Adrenalin. Hydrochlor.	..	..	..	3j
Sod. Chlorid.	..	..	..	gr. 3
Glucosum	..	..	..	gr. 10
Thymol water ad	..	..	..	3j

For internal administration the following is recommended :

R Calc. Lactat.	gr. 15
Ephedrinae Hydrochlor.	gr. $\frac{1}{2}$
Tinct. Belladonnae	M 5
Aq Camphorae ad	3ss

A tablespoonful t d s.

Zinc ionization of the nasal mucous membrane attained considerable popularity some years ago, but has not stood the test of time, the atrophic state of the nasal mucous membrane which it produced being of no permanent value to the patient.

Many patients "put up" with the disease, preferring its transient discomfort to repeated and expensive courses of treatment.

HEADACHE

Like Heinz's products there are, according to Price's *Textbook of Medicine*, 57 varieties of headache, the causes ranging—alphabetically—from acromegaly to vacuum. A full catalogue would be out of place here, but most headaches are probably due to a toxæmia of some kind, among many others being constipation, alcohol, secondary syphilis, a septic focus, or fever of any sort. In another class are headaches due to infection of the sinuses, the characteristic symptom being that they are worse in the morning. Anything producing a rise of intracranial pressure, such as cerebral malaria, meningitis, tumour, encephalitis, oedema of the brain following injury or concussion or occurring in the hypertensive cerebral attack will not unnaturally produce a headache.

Eye strain is a fairly common cause, but perhaps not so common as is generally supposed, a point worthy of note being that minor errors of refraction are more likely to produce headache than are gross errors, because in the latter case the eye does not strain to overcome the error.

A rise or fall (as sometimes seen after a spinal anaesthetic) in the pressure of the cerebrospinal fluid can produce an agonizing headache, as can a rise in blood-pressure; finally, there is migraine the cause of which is still debated.

If a cause can be found it is treated or removed, but in that large group of headaches for which no definite cause can be found we are driven back on the analgesics, the most popular of which is aspirin; this is sold under many fancy names, but as it is a definite chemical compound no one brand has any peculiar merit so long as it is made by a reputable firm and is fairly fresh. In contact with moisture it decomposes into acetic and salicylic acids, so if the sample smells powerfully of the former it should be rejected. The following "headache powders," roughly in order of strength, are all effective and most of them are popular. They are conveniently given in a capsule.

R Aspirin.	aa	R Aspirin.	aa
Phenacetin. }	gr. 5	Phenacetin. }	gr. 5
Caffein Cit.	gr. 2	Codein. Phos	gr. $\frac{1}{2}$
		(Similar to Veganin and Codopyrin)	

B. Amidopyrin.	}	..	..	..	..	23
Aspirin.						gr. 5
Phenacetin.						
B. Amidopyrin.	}	..	..	..	..	23
Aspirin.						gr. 3
Phenacetin.						gr. 1
Phenobarbiton.	..	..	..	..	..

Care must be taken in giving amidopyrin, because some people have an idiosyncrasy to it and agranulocytosis may develop; it is not advised for old people or chronic invalids.

Allonal, Cibalgin, Saridone, Didial, etc., are all very effective in the treatment of acute headache and are similar in constitution to one or other of the powders recommended, but none of these prescriptions, powders or tablets should be given constantly or they may become habit-forming. The cause of a chronic headache should always be discovered (*see also* Migraine).

HEAD INJURIES

Observance of the following general principles has saved many lives:

- Treat every head injury seriously and, if possible, admit the patient to hospital.
- If shock is present, treat it first.
- Make a thorough and painstaking examination in the early stages; it will save trouble and perhaps life later on.
- Get an accurate history whenever possible.
- Have the pulse and temperature taken and recorded every half hour while the patient is unconscious.
- Do not prolong convalescence unduly as it makes the patient introspective and gives him headaches.

ROUTINE IN THE CASE OF AN UNCONSCIOUS PATIENT.—

- Find out the nature of the accident and how long he has been unconscious.
- Estimate the degree of shock by looking well at the patient, feeling his pulse and his skin (is it clammy?) and taking his blood-pressure.
- Estimate the depth of unconsciousness.
 - Say loudly and clearly in the patient's ear "Open your mouth," or some such command. If he obeys he is at any rate not comatose.
 - Pinch his skin or prick him; if he makes a responsive or resentful movement he is not deeply comatose.
- Carefully examine:

The head, face and neck for signs of injury. (A clotted haematoma which has softened in the centre, feels just like a depressed fracture, but the edges can be moved and pitted.)

The eyes; do they react to light? Are the pupils equal? (The larger one is on the side of the injury.) A black-eye or sub-conjunctival haemorrhage suggests a fracture of the anterior fossa.

The nose and throat; blood suggests a fracture of the ethmoidal plate, and cerebrospinal fluid makes it certain. Pour a few drops of water on the tongue, if the swallowing reflex is present the patient is not deeply comatose—and will be easier to feed.

The ears; if there is blood or cerebrospinal fluid there is a fracture of the base and the case is serious. Examine the rest of the body for signs of injury, hemiplegia, etc. The plantar reflex may be extensor on the side opposite to that injured.

The bladder; if palpable above the pubes, pass a catheter. Further treatment will depend upon the discoveries made in the above examination and on the progress of the patient.

Position in bed.—An unconscious patient should be put in the semi-prone position in order to prevent inhalation of blood or saliva or dropping back of the tongue, and turned over on the other side every 3 or 4 hours.

Concussion.—Unconsciousness may last for a few minutes or a few hours, but if it lasts for more than twelve hours there is damage to or bruising of the brain with oedema or haemorrhage. Cerebral oedema can be relieved by giving half a pint of 30% mag. sulph. solution by rectal drip, or 20 c.c. of a 10% solution of mag. sulph. or 100 c.c. of 30% glucose by the vein.

Deepening Coma.—This occurring some hours after the accident means that haemorrhage is taking place inside the skull and must be stopped if the patient is to survive. If the pulse is slow or getting slower immediate operation may save life, but if it is fast and getting faster the patient will die. A rising temperature is also a bad sign.

The site of injury may indicate the site of haemorrhage, and the side on which the haemorrhage is occurring may be shown by a dilated pupil on that side, or by limb rigidity and a plantar extensor reflex on the opposite side. Frequently, however, haemorrhage is basal or bilateral. It may be intradural, extradural or both. The cerebrospinal fluid in intradural haemorrhage contains bright blood and in extradural may be tinged with blood. (Note.—Blood due to the puncture of a vessel by the spinal needle becomes less as the fluid flows.)

The commonest site of extradural haemorrhage is the anterior branch of the middle meningeal artery or vein, the next commonest is the posterior branch.

The anterior branch, running upwards and forwards, crosses a point two inches behind the external angular process of the orbit and two inches above the zygoma. The posterior branch, running upwards and backwards, crosses a point one and a half inches

above the external auditory meatus. It is now considered that extradural haemorrhage comes more commonly from a vein than from an artery, but in the writer's experience this is by no means always so. When a trephine opening has been made intradural haemorrhage is shown by the purple colour of the dura; it should be opened, the clot gently spooned out and the bleeding point, if in the dura, undersewn with an ophthalmic needle armed with fine silk. Parke Davis's Thrombin would seem to be an excellent preparation for this kind of case.

Haemorrhage from the superior longitudinal (sagittal) sinus is best dealt with by trephining and plugging. If the dura can be detached from the skull and the sinus undersewn and ligatured, so much the better. The patient should be kept in the Fowler position.

When there is a scalp wound, excise it with a sharp knife, carefully examine the skull beneath and remove all débris. Further procedures depend upon the severity and nature of the patient's symptoms and the local condition of the skull. If no bone injury is seen, sew up the wound; if a fracture is found it is better to sew up the wound and explore the skull through a horseshoe incision with the wound as its centre.

If there is a depressed fracture make a small trephine hole at one edge of it and carefully raise the bone by means of an elevator passed through the trephine hole.

If there is much comminution of bone, remove only such pieces as are absolutely loose (they will be few) and flood the area with penicillin solution, 1,000 units per c.c.

If the dura has been torn and the brain injured, gently irrigate with normal saline and apply a "sucker" if there is one, or with a large size rubber catheter attached to a ear syringe suck out the pulped brain tissue and blood; then flood with penicillin lotion as above, insert a glove-rubber drain, close the wound as well as possible and hope for the best. At a primary operation where there is a likelihood of infection it is not advisable to introduce anything in the nature of a foreign body, but when asepsis is assured a defect in the dura can be closed by means of sterile amniotic membrane or a strip of fascia lata.

The diagnosis and treatment of intracranial haemorrhage was considered above.

Such is a very brief outline of the principles of treatment of a head injury. Needless to say, if there is any fear of sepsis prophylactic chemotherapy is given, nursing must be careful, the bowels must be kept open and the patient fed, by nasal tube if need be. An exacerbation of symptoms during convalescence suggests intracranial sepsis.

The length of stay in hospital naturally depends upon symptoms, but a case of mild injury with unconsciousness of less than two hours and a full return of mental faculties should remain in for ten to fourteen days. It is a mistake to keep a head-injury case in bed too long, to fuss over him too much, to give him too many sedatives for

the headache that always follows severe injury, or to suggest that complete recovery from all symptoms is unlikely.

Amnesia after head injuries, if lasting for more than four or five days is often due to a subdural effusion; this is not the same thing as a rise in the pressure of the cerebrospinal fluid, which lies between the arachnoid and the pia mater and can be relieved by lumbar or cisternal puncture. The treatment of subdural effusion is to open the dura through a small trephine or burr hole on each side of the skull and let the fluid out; if the brain does not expand a drain should be inserted, with the utmost aseptic precautions. Voris, quoted by Bailey, fills the space with distilled water, clamps the tube and sews up. He then gives 1,000 c.c. of distilled water intravenously, followed by 1,000 c.c. of normal saline; the drainage tube is unclamped after six hours.

HEART DISEASE

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The function of the heart is to beat and as long as it does this regularly and efficiently in all circumstances it is a good heart, no matter what noises it makes in the process. Murmurs, therefore, remain valuable as diagnostic indications, but not as guides to prognosis and treatment; it is no longer usual to keep a healthy young man in bed because he has a murmur in his heart.

The heart of an athlete must be capable of temporarily working much harder than that of a shopkeeper, but a heart which is handicapped in any way, as by defective valves, pericardial adhesions, mitral or aortic stenosis, or a rise in blood-pressure has to work harder for the rest of its life. It is obvious that in such cases the margin of reserve for competing with exertion, illness and old age is less than in a heart with no such handicaps. Our first aim, therefore, is to find out how well the heart is doing the work assigned to it, our second is to find out if it has any handicaps to overcome, our third to discover what they are, and our fourth is so to advise and treat the patient so that any handicaps may be overcome or even abolished.

EXERCISE TOLERANCE.—Except for impending coronary thrombosis, which will be discussed later, it can be confidently assumed that if a patient can take vigorous exercise without

discomfort, dyspnoea or distress there is not much wrong with his heart.

Exercise tolerance tests are of two kinds, (1) the observer can see how much exercise it needs to distress the patient or (2) he can see the effect of a standard amount of exercise; the latter is more convenient in the consulting room, but the former can be carried out as a weight-lifting exercise, Lewis's method being to count how many times the patient can lift a ten-pound or twenty-pound weight above his head without distress. A healthy young man can lift it 30-60 times, an athlete more, and an invalid less; the exercise should not be tried when the heart is known to be at fault and should always be stopped as soon as the patient begins to pant.

STANDARD EXERCISE.—The writer's practice is first to count the patient's pulse and then to make him alternately stand and squat 30 times in 60 seconds; the heart is then listened to with a stethoscope and the number of beats in each five seconds counted and preferably written down. If the heart is healthy and has an initial rate of 72, the usual count is somewhat as follows: 9, 9, 7, 8, 9, 8, 8, 7, 8, 6, 6, 6, 6, etc., the pulse resuming its normal rate quite suddenly, often at about the 40th second; a healthy heart should show the pre-test pulse rate within a minute and a half or at most two minutes.

Exercise tolerance tests should not be carried out within two hours of a meal or within ten minutes of a smoke.

For a bed-ridden patient the writer puts his hand on the patient's feet, tells him to sit up and lie down 20 times in about 40 seconds and observes the effect as in the squatting test. All such tests must be stopped at once if the patient wishes it.

Inability to perform the above tests without distress indicates that either a good heart has too much work or a bad heart cannot do normal work, and the reason may be in the heart or somewhere else, for instance, a patient with severe anaemia or a pleuritic effusion will be just as distressed as a patient with mitral stenosis or myocarditis.

DISORDERS OF RHYTHM.—Much light has been shed on these by the electrocardiograph, which not only gives an accurate picture of disorders of rhythm, but indicates where any block in the cardiac impulse or the origin of any extra impulse is situated.

For a full dissertation on electrocardiography the reader is referred to one of the many books on the subject and only a short description, enough to give some insight into disorders of rhythm, will be given here.

Eindhoven, the inventor of the electrocardiograph, identified five waves on the record, which he named P, Q, R, S, T, not for any particular reason, but because these letters were not being used for any similar purpose.

In a normal heart, the beat originates in the sino-auricular node, situated at the base of the superior vena cava; this impulse causes the P Wave (see Fig. 24).

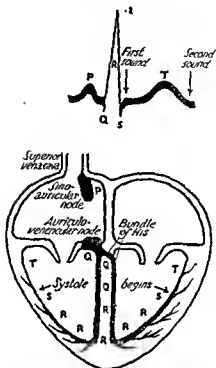


Fig. 24.—The cardiac impulses

From the sino-auricular node the impulse spreads all over both auricles to the auriculo-ventricular node near the right border of the inter-auricular septum; this spread occurs during the P-R interval.

An impulse is thus aroused in the auriculo-ventricular node and passes down both sides of the bundle of His to stimulate the ventricles; this impulse causes the QRS complex.

Finally, the impulse reaches the base of the heart and the ventricles contract firmly, squeezing out all the blood they contain; this causes the T Wave.

EXTRASYSTOLES.—These are extremely common and can generally be disregarded. They arise from an ectopic focus in the auricle, as shown by an extra P Wave, or in the ventricle, as shown by the absence of a P Wave. Adolescence, septic foci, debility and smoking are the chief causes of extrasystoles that do not matter, and myocardial degeneration and impending auricular fibrillation of those that do.

The ordinary extrasystoles are abolished by exercise, but recur during rest. If they are troublesome quinidine, about 3 grains 3 times a day, will abolish them.

The finding of extrasystoles is an indication for a careful

examination of the heart, including the blood-pressure, and a careful inquiry into the patient's symptoms and habits, but in otherwise healthy people they can be ignored.

SINUS ARRHYTHMIA.—Although this is a physiological condition it deserves mention because it is often mistaken for something pathological. The heart of most young people beats a little faster during inspiration than during expiration and in some patients this normal fluctuation is exaggerated; if the patient is instructed to take very deep, slow breaths it is still more noticeable and it disappears if the heart is quickened by exercise or drugs. Some years ago the writer was asked to see a child at Mount Ahu, whose parents had been warned not to let her run about or play with other children because she had an irregular heart. The child was miserable and the parents were apprehensive. A careful examination revealed simple sinus arrhythmia, the child was given full liberty and has remained well ever since.

SIMPLE TACHYCARDIA.—This begins gradually and ceases gradually, and some cause is usually found such as exercise, excitement, fever, anaemia, focal sepsis, over-eating, drugs, haemorrhage or hyperthyroidism. It is also found in ber-beri. Treatment is that of the cause.

PAROXYSMAL TACHYCARDIA.—An attack begins and ends quite suddenly, often has no apparent cause, and may last from a few seconds to several days. The pulse rate is usually about 160 and is unaffected by exercise; rheumatic heart disease, especially mitral stenosis, is often associated and there may be a septic focus, constipation or some other pathological condition.

Treatment is simple and dramatic. Tell the patient to take a deep breath, to hold it as long as he can, and to try to expel it with the glottis closed. If this fails, make pressure on the carotid sinus; one or other carotid artery is firmly pressed backwards against the vertebral column just below the angle of the jaw. If one side fails, try the other, and if neither succeeds press one eyeball firmly with sufficient force to hurt the patient but not to damage the eyeball.

To prevent recurrence of attacks eliminate all possible causes, both physical and emotional. Quinidine gr. 3 twice or three times a day will often prevent attacks as also will digitalis in fairly full doses.

AURICULAR FLUTTER.—This is rare in India, and is usually a prelude to auricular fibrillation; it should always be suspected in a rheumatic heart which consistently beats at a rate of 140 or over. It is of great electrocardiographic interest, because the P Wave (auricular contraction) is seen to occur at high speed, for instance 300 a minute, but the ventricle responds to one out of every two or three impulses, the common ratio being one to two. The condition is amenable to digitalis, which increases the heart block and thus slows the ventricles. Quinidine has also been used.

AURICULAR FIBRILLATION.—This rapid and irregular irregularity of the heart beat is the commonest of all pathological

anomalies of rhythm, and is usually of serious but not dangerous import. If the reader will alternately flex and extend all his fingers simultaneously about 72 times a minute, he will get an idea of how the auricle should contract; if he twiddles them all independently, irregularly and rapidly he will get an idea of what the auricle is doing when it fibrillates.

The reader will also readily deduce what the electrocardiogram looks like: instead of a regular succession of P waves followed by the QRST complex, the P waves are represented by a rapidly trembling line formed by the impulses as they flash all over the auricles, and followed by irregularly spaced QRST complexes as the auriculo-ventricular node picks up odd stimuli. Uncontrolled by digitalis the node picks up, and the ventricles respond irregularly to about 150 of these impulses per minute.

Treatment.—The basis of modern treatment is to slow the ventricles by means of digitalis so that they beat at a normal rate, although retaining their irregularity (*see below* under Digitalis). Occasionally it is possible to restore normal rhythm to the auricles by means of quinidine, of which the dose is 3-5 grains three times a day, but modern thought does not advise this for three reasons, (1) it may not work, (2) recurrence is likely, and (3) there may be a clot in the auricular appendix whose dislodgment would prove instantly fatal; in early cases, however, it may sometimes be successful, but should always be preceded and followed by digitalis therapy.

Some years ago certain of the American schools advocated total thyroidectomy for the treatment of auricular fibrillation and published some impressive results; more recently thiouracil (*see* Thyroid Gland) has been used for the same purpose. Thyroidectomy is not without danger, so before it is even considered the basal metabolic rate must be carefully investigated; it should also be examined before thiouracil is given. A point worth remembering about auricular fibrillation is that during an illness, especially influenza, it may appear temporarily in the aged or the debilitated, only to disappear when the patient gets well.

CONGESTIVE FAILURE.—The classical signs are:

- (1) Dyspnoea.
- (2) Cyanosis.
- (3) Dilatation of the veins in the neck when the patient is semi-recumbent or even sitting, or of those in the hands and arms when they are above the level of the heart.
- (4) Enlargement and tenderness of the liver.
- (5) The patient cannot lie down without great distress. One can often diagnose these cases on entering the room; the patient is sitting up in bed, breathing painfully and laboriously and either hugging some pillows or resting his head on his arms, which are folded over his bent knees. An examination of the chest and the history will exclude asthma.

- (6) The pulse generally, but not always, shows the gross irregularity of auricular fibrillation.

Treatment.—If the case is very urgent, give intravenous strophanthin gr. $\frac{1}{100}$ or Digoxin gr. $\frac{1}{100}$ and then bleed the patient of a pint of blood; if it is less urgent the bleeding may be omitted.

In an emergency, if a wide-bore transfusion needle is not handy, by far the best way of bleeding is as follows:

- (a) Put a mackintosh sheet or several layers of newspaper under the patient's elbow.
- (b) Take or measure a pint receptacle.
- (c) Put a "venous" tourniquet round the patient's arm so as to dilate the already engorged veins still further.
- (d) Sterilize the skin over the most prominent vein in front of the patient's elbow.
- (e) Take a sterile cataract or abscess knife and with the edge towards you thrust the point into the vein and quickly make a longitudinal cut about a centimetre long.
- (f) Collect the blood in the measured basin, removing the tourniquet, raising the arm and applying a sterile pad to the incision as soon as a pint has been withdrawn. The pad is left on for three or four days.
- (g) Repeat the strophanthin or Digoxin after an hour and thereafter as circumstances dictate; as these drugs are oxidized slowly they should not, as a rule, be given oftener than once in 24 hours if the pulse is beating at a normal rate.

HEART BLOCK.—The inherent pulse rate of the isolated ventricle is about 30–36 a minute and if a pulse beats constantly at this speed complete heart block is almost certainly present (Lewis).

Napoleon Bonaparte is said to have had a pulse rate of about 40 per minute, and occasional cases of simple bradycardia do occur, but they are rare. Exercise quickens the heart in simple bradycardia, but not in heart block. Heart block may be partial (often 2 to 1) or complete; in the latter case no impulses get through from the sino-auricular node to the ventricles; the reader will hardly need to be told that the condition is due to a lesion of the bundle of His; this may be the result of rheumatic fever, senile degeneration or syphilis; temporary causes are various fevers, especially influenza in old people, pneumonia and diphtheria, and also certain drugs, of which digitalis in large doses is the chief. Congenital heart block occasionally occurs due to absence of the upper part of the inter-ventricular septum, so the bundle of His is broken.

The condition can be diagnosed at the bedside by the slow and inconstant heart sounds, while occasionally a first sound, not followed by a second, can be heard at the base. The electrocardiogram is pathognomonic, the P waves either having no relation to the QRST complex (complete heart block), or only a certain proportion of them being followed by the complex (incomplete heart block).

Apart from the temporary varieties mentioned above, the condition is both serious and incurable, as it indicates widespread disease in the myocardium; patients generally die within one or two years.

Treatment is by rest and by any remedies which help to cure the causative disease.

ORGANIC HEART DISEASE.—In babyhood, organic heart disease is congenital, from youth to early middle age it is due to rheumatism, in late middle age to syphilis, but less commonly in India than in Europe, and in old people to arteriosclerosis, high blood-pressure and myocardial degeneration.

In general, congenital heart disease tends to open abnormal channels and to cause stenosis of the normal, rheumatism attacks the myocardium and the mitral valve, syphilis attacks the aortic valve and arch, and diphtheria and old age the muscle of the heart. As the heart can never rest, disease of one part is apt in time to affect the mechanism and performance of the whole organ.

CONGENITAL HEART DISEASE.—This is of three grades; it may (a) be incompatible with life, (b) cause cyanosis and clubbing of the fingers, or (c) cause practically no symptoms or signs except a loud murmur at the base. The "congenital heart" is liable to infection, particularly subacute bacterial endocarditis.

When cyanosis and clubbing of the fingers are present the usual reason is a defect of the septum, often associated with pulmonary stenosis; there is a loud, rough systolic murmur over the pulmonary area and the red cell-count may be very high. These patients generally die in infancy or childhood, but a few survive to a precarious adult life. As remarked later, a large defect in the interventricular septum will interrupt the bundle of His and cause complete heart block.

When there are no symptoms or signs except a humming sound, heard best over the second or third left costal cartilage, loudest during systole, but never ceasing, and accompanied by a thrill, the cause is patent ductus arteriosus, probably associated with a septal defect. (Congenital lesions are often multiple.) Successful closure of a patent ductus is now possible.

The other symptomless congenital lesion is coarctation of the aorta, in which the vessel is very stenosed or even absent below the left subclavian artery. The work of the aorta is largely carried out by the enlarged internal mammary arteries, which groove the ribs with notches visible in X-ray pictures. The blood-pressure in the head and arms is high, and that in the legs is low, the femoral pulse often being imperceptible to the finger.

RHEUMATIC HEART DISEASE.—This is almost always acquired in childhood; small areas of inflammation—Aschoff bodies—appear, amongst other places, in the myocardium, while repeated attacks of inflammation of the mitral, and to a less extent of the aortic valve, ultimately cause fibrosis; as with fibrosis elsewhere, such as that following a severe skin burn, the result is contracture and deformity. The valve cusps therefore do not fit,

or become stuck together at their base, causing stenosis. The mitral valve is chiefly affected, but the aortic may be involved, causing aortic regurgitation or rarely stenosis. Rheumatism is also the common cause of pericarditis.

The characteristic thrill of a developed mitral stenosis is felt over the left ventricle, and the murmur is a rough, presystolic sound heard best just above the apex, but as already pointed out its interest is in its diagnostic value; treatment is dictated by the way in which the heart beats.

SYPHILIS AND THE HEART.—For some reason, perhaps the prevalence of malaria, perhaps the lower average age of the population, syphilis in India is a less serious disease than it is in Europe and one does not see the numbers of cases of aortic disease, tabes dorsalis and other late sequelae of syphilis that are so common in the hospitals of that unhappy continent.

AORTIC REGURGITATION.—This is a serious condition; if due to rheumatism it is associated with mitral stenosis, which usually overshadows it in pathological importance. Pure aortic regurgitation is almost always due to syphilis, not only the valves of the aorta being attacked but the strong elastic coat of the vessel itself, so aneurysm of the aorta may be present too. Unfortunately, by the time the case comes under observation, the damage already done is throwing a severe strain on the heart and circulation, so although vigorous anti-syphilitic treatment can arrest the infective progress of the disease it cannot repair the mechanical damage. In conjunction with the modern anti-syphilitic remedies potassium iodide should always be given and the patient should live well within the limits imposed by his disability.

Diagnosis is generally easy, the water-hammer pulse not only can be felt, it can be heard, as an ear placed on the patient's antecubital fossa will show; confirmatory observations are the marked pulsation of all the vessels and the replacement of the second sound in the aortic area by a loud murmur as the blood rushes back into the left ventricle instead of being smartly stopped by the flaps of the valve.

INFECTIVE ENDOCARDITIS (subacute bacterial endocarditis).—A long, unexplained fever, accompanied by anaemia and occurring in a patient with a heart already damaged by endocarditis or congenital malformation should always make one suspect infective endocarditis; the diagnosis is confirmed by growing streptococci (generally *Str. viridans*) from the blood.

Treatment.—This hitherto fatal disease is now curable by penicillin, with which small doses of heparin and dicoumarin (a quarter to half of those recommended below for coronary thrombosis) may be given. Penicillin is given in large doses for a long time, an average being half to one million, or even more, units a day for six or more weeks by intramuscular injection every three hours.

Ulcerative Endocarditis is treated similarly.

PERICARDITIS.—As the physical signs are not always clear this serious disease is apt to be missed, because it is not thought of, or is diagnosed when it is not present.

It is not uncommon in the acute stage of rheumatic fever, often beginning about a fortnight after the onset, sometimes much later or during a recrudescence, and occasionally being the first manifestation of that great enemy of the human heart.

Sometimes it occurs by direct spread from a neighbouring pneumonia or pleurisy and, occasionally, it is due to tubercle. Other organisms may also cause it, and a localized temporary "traumatic" pericarditis occurs with coronary infarction.

As with pleurisy, the condition may be dry, wet or purulent, and a large effusion suggests tubercle. When a pericardial effusion occurs in chronic nephritis, or in chronic venous congestion and heart failure, "death is waiting round the corner."

PERICARDITIS WITH EFFUSION.—This is easier to diagnose than dry pericarditis; if the patient's condition is fairly good, the fluid may be drawn off, the fifth left interspace usually being chosen for the puncture. The greatest care must be taken not to puncture a coronary vessel, so the needle or trocar is inserted slowly with frequent aspirations by means of a syringe and if fluid is not easily found the attempt is abandoned. Mercurial diuretics may also be useful.

Dry pericarditis may give rise to all kinds of murmurs, loud or soft, squeaky, rubbing or musical, systolic or diastolic, but they all have a rather unusual quality and often change with the position of the patient, so that if a murmur does not sound like a valvular murmur think of pericarditis.

The treatment of acute pericarditis is by complete rest and chemotherapy.

Chronic adhesive pericarditis may be incomplete, with bands of adhesions (which often produce the various murmurs referred to above), or complete, with the two layers of the pericardium stuck together. The latter condition puts the heart at a grave mechanical disadvantage, to which it responds by hypertrophy, which may be enormous; it also may constrict the entries of the vena cava, causing venous stasis and throwing a great strain on the left ventricle, which is ultimately called upon to force the blood through the narrowed openings. Various ingenious and difficult operations are performed in order to free the heart from these oppressive adhesions, one of the simplest being resection of those parts of the ribs in front of the heart which prevent it from contracting freely.

EFFORT SYNDROME.—This condition, which is always much commoner during wartime, is characterized by the onset of palpitation of the heart and shortness of breath after a quite inadequate amount of exercise.

The first essential, before making the diagnosis, is to make sure that hyperthyroidism, beri-beri or organic heart disease is not present; patients with incipient tuberculosis or septic foci, and

those convalescing from some illness such as influenza or pneumonia, are especially liable to develop the syndrome.

The above having been eliminated we are left with the genuine case; he is usually a nervous, thin, flat-chested, clammy-handed, seedy-looking, seborrhoeic, sedentary young man who, owing to the exigencies of the service or the necessity of earning a living has been thrust into some form of employment which not only requires increased physical effort, *but is one that he fundamentally dislikes*. The typical early example is the studious young man who develops tachycardia when doing strenuous rifle drill at six in the morning, although he had previously been able to play tennis without discomfort.

Important signs are:

- (a) The heart and breathing are normal when the patient is asleep.
- (b) The response to exercise tolerance tests (*see above*) is abnormal and exaggerated.
- (c) Tachycardia may be present throughout the patient's waking hours and he is nervous and ill at ease.
- (d) The cardiac impulse is generally exaggerated in every way, namely in speed, in size and in force. This may give the clinical impression that the heart is dilated, but X-ray examination will show that it is not.

The treatment of these cases is difficult; about 30% of them get perfectly well and the rest continue to have what is best described as an irritable heart. As a great many of them are due to "putting a square peg into a round hole" the best cure is to find the appropriate square hole. In Europe and America, World War II was much better in this respect than its predecessor, but although India was largely protected by the caste system some very curious misdirections of talent occurred, the most remarkable that came under the writer's notice being an unfortunate batch of men from South India who thought they were being enlisted as "sappers," when the word was really "sweepers."

The first point the physician must be sure of is that the case is really one of effort syndrome. Being certain of this he can then tell the patient with every confidence that there is nothing wrong with the heart, that the more normal a life he lives the better will his heart be, and that if he gets palpitations from time to time he is not to worry about them. Unfortunately, the patient does not always believe this, especially if he has been or goes to another doctor who gives a gloomy prognosis.

To sum up, make sure of the diagnosis, do not treat the patient either as an invalid or as a malingerer, and find a "square hole" whenever possible. (*See also Hysteria.*)

DIGITALIS.—This is the most useful drug in the whole of cardiology, and one of the most abused in the whole pharmacopoeia. Who has not seen a hypodermic injection of digitalin given to a

collapsed or even moribund patient? Even if the dose had been adequate it could not possibly have had any effect for several hours; the only excuse is that it might satisfy the anxious or even sorrowing relatives that everything possible was done, a kindly deceit of which we are all guilty at times.

Digitalis acts by lengthening the conduction time at the auriculo-ventricular node; in other words it produces a slight heart block. This effect is achieved by stimulation of the vagus and is beautifully seen on the electrocardiogram as a lengthening of the P-R interval. In excessive doses it increases the irritability of the myocardium and produces coupled beats, and enormous doses produce ventricular fibrillation and death. The drug is slowly excreted, a full dose requiring 12-13 days for complete elimination and a smaller dose about a week. Lewis states that the body will use up or excrete about 20 minims of the tincture in 24 hours; he makes the further important observation that "a reaction is not usually obtained until 5 drachms of the tincture have been accumulated in the body."

Thus it will be seen that there are two dosages for digitalis, the initial and the maintenance, the former being much larger than the latter, and always being given in urgent cases, *but the physician must be certain that the patient is not already being given digitalis.* A simple way of "digitalizing" a patient is to give him one maximal pharmacopoeial maintenance dose per stone of body weight per 24 hours for 48 hours. Half the first 24 hours' ration is usually given in the first dose. In the case of a patient weighing 10 stone this would be 15 minims of the tincture multiplied by 10, that is 150 minims, in the first 24 hours and the same in the second 24 hours, which adds up to 300 minims or Lewis's five drachms. (Ten minims of the tincture are equal to one grain of *Digitalis Pulverata*.)

The drug achieves its greatest success in auricular fibrillation with a rapid heart, because not only will it bring the pulse rate under control, but will keep it there for years if necessary; it is of use in any case in which the heart is acting feebly or, in the absence of fever, consistently beating more than 90 times a minute. In cases of fever, particularly pneumonia, when there is a strain on the heart digitalis is of use because it slightly prolongs the resting phase; when the heart is handicapped and perhaps irritable from pericarditis digitalis has a beneficial steadying effect.

To sum up, the correct dose of digitalis is that which produces or maintains a pulse rate of between 60 and 70 per minute, the initial dose being equivalent to about 5 drachms of the tincture in the first 48 hours and the maintenance dose in the region of 20-30 minims per 24 hours thereafter; if the pulse drops below 60 the dosage must be cut down.

The various kinds of digitalis on the market fall into two groups, depending upon whether they are derived from the *Digitalis purpurea* or from the *Digitalis lanata* plant.

There are important differences between the two; *Digitalis purpurea* (the Digitalis of the pharmacopoeia) takes 4-8 hours to

act, has to be standardized biologically and is only about one half to one fifth as strong as the newer *Digitalis lanata*. *Digitalis lanata* acts in an hour by the mouth or in a few minutes by the vein and needs no biological standardization because the main derivative digoxin is a crystalline compound. Its main drawback in the writer's experience is that, in pharmacopoeial doses by the mouth, it is much more apt to cause vomiting than the older *Digitalis purpurea* derivatives. He therefore uses it mainly for emergencies and the older preparations for maintenance.

DIGITALIS PURPUREA.—The most popular pharmacopoeial preparations are *Digitalis Pulverata* (dose: $\frac{1}{4}$ – $1\frac{1}{2}$ grains for repeated doses, 3–10 grains for a single dose) and *Tinctura Digitalis* (dose: 5–15 minims for repeated dosage, 30–90 minims for a single dose). The former keeps better than the latter and is best given in capsules after food. Among the proprietary preparations the best known are Parke Davis's *Digifortis* which is nearly twice as strong as, and more stable than, the tincture, and Nativelle's crystallised Digitaline (Nativelle's Granules) which have been deservedly popular in England and Europe for many years; they are supplied in two strengths, pink (weak) containing $\frac{1}{8}$ mg. ($\frac{1}{16}$ grain) of digitoxin and white (strong) containing $\frac{1}{4}$ mg. ($\frac{1}{8}$ grain) of digitoxin, the former constituting an elegant and stable maintenance dose for most cases.

DIGITALIS LANATA.—This is a comparatively new drug, which is sold as Digoxin (B.W. & Co.) or Digilanid (Sandoz). Its greatest use is perhaps in congestive failure, when it should be given intravenously as already mentioned. The initial dose of Digoxin is one milligram intravenously or $1\frac{1}{2}$ milligrams by the mouth; in the former case the effect begins in 5 or 10 minutes and reaches its maximum in an hour; when given by the mouth Digoxin begins to take effect after about an hour, the maximum being reached after about six hours. The maintenance dose is usually a quarter of a milligram twice daily by the mouth, but as already remarked all maintenance doses must be controlled by their effect on the pulse rate, the ideal being between 60 and 70 beats per minute.

STROPHANTHIN.—If Digoxin or Digilanid is not available and quick action is required, strophanthin should always be given, the intravenous dose being $\frac{1}{8}$ grain, repeated after an hour. It takes effect as quickly as Digoxin and is a most valuable drug for emergencies.

SYMPTOMS OF DIGITALIS POISONING.—These are three, (1) vomiting, (2) excessive slowing of the heart, and (3) coupled beats.

Patients vary in their susceptibility to the drug, some vomiting on small doses, others never; in some difficult cases it may be impossible to give enough digitalis by the mouth without causing vomiting. Intramuscular or intravenous injection of Digoxin or strophanthin should then be tried.

As already mentioned, if the heart beat drops below 60 per minute the dose of digitalis must be cut down.

Coupled beats are a danger signal and show that the irritable-myocardium phase is being reached, which has its final expression in ventricular fibrillation and death. The second beat originates in an ectopic focus in the ventricle, caused by the previous doses of digitalis. The drug must be stopped at once and atropine may be given.

CORONARY DISEASE

CORONARY SCLEROSIS AND ANGINA PECTORIS.—When an apparently robust middle-aged person suddenly has a severe attack of "flatulent dyspepsia" the cause is often coronary thrombosis; when the same sort of person suddenly dies a natural death the cause is almost certainly coronary thrombosis.

As our knowledge of the relation of symptoms to lesions increases, the old division into angina of effort, pseudo-angina, angina pectoris and coronary artery disease has tended to disappear; indeed Levine says "I have never yet failed to find some disease of the coronary arteries in any of my own cases of angina that have come to post-mortem examination, with the exception of the few who had marked aortic stenosis."

If the reader has ever been unfortunate enough to go on a route march wearing a pair of tight puttees, he will remember the agonizing pain in the calves of his legs; the reason was that the active muscles were not getting enough blood. Exactly the same reason causes exactly the same pain in the heart.

We can easily see that if the coronary arteries are sclerosed various things will happen. The amount of blood normally flowing through the heart will be lessened, inviting myocardial degeneration; the arteries will have lost their elasticity, and cannot dilate to give the heart the extra blood it needs for extra work, so there is angina of effort; worst of all, the blood in one or more of the arteries may clot, causing coronary thrombosis.

The signs of coronary artery disease are few and variable, but the symptoms are characteristic so justify some description.

The disease shows a strong hereditary tendency, is commoner in men than in women and commoner in the busy brain worker than in the countryman; the usual age of onset is between 50 and 60. Levine makes the interesting observation that, in his experience, the disease is always associated with high blood-pressure in women, but not necessarily so in men, whose blood-pressure may be raised, normal or low.

An Anginal attack commonly begins during exercise, especially on going up hill, and if the patient perseveres his pain gets worse, but if he stops it stops too; after a few attacks the patient gets to know how much he can do without getting a pain. When this history is given it is pathognomonic.

The situation of the pain is characteristically behind the sternum, whence it may radiate in various directions, most commonly down the inner side of the left arm or sometimes into the epigastrium, neck or right arm. The pain is continuous, not throbbing or fluctuating.

On the other hand, the first or any attack may be severe (or even

the last); the patient remains stock-still, his face grey and covered with beads of sweat; he will sit down but not lie down and if he does not obtain prompt relief he may die. For this reason these patients are never without their capsules of amyl nitrite or their tablets of nitroglycerin, and seldom without the fear of death during an attack. A true anginal attack never lasts more than a few minutes; if it lasts longer it is either not angina or is due to coronary thrombosis. The immobility of the victim of an anginal attack is very striking.

In the consulting room the diagnosis may be confirmed by producing or stopping an attack of pain. The former can be achieved by exercising the patient or by giving him an injection of $\frac{1}{4}$ –1 c.c. of adrenaline solution, and the latter by amyl nitrite inhalation or by letting him dissolve a nitroglycerin tablet (gr. $\frac{1}{100}$) under his tongue. Adrenaline should never be used as a test in severe cases because it may kill the patient, but in mild cases its effect can be neutralized by amyl nitrite.

Treatment.—The treatment of anginal attacks is first to keep the patient within the limits imposed by his pain, a thing he generally does for himself. Secondly he should always carry amyl nitrite capsules or nitroglycerin tablets (gr. $\frac{1}{100}$); the latter are chewed or dissolved under the tongue, and bring relief almost as quickly as, and for a longer time than, amyl nitrite; they also do not give the patient the unpleasant feeling that his head is bursting or that he is being anaesthetized. In a hot climate the capsules have the further drawback that they may surreptitiously burst and an empty capsule which was thought to be full may mean disaster.

In Neuwahl's hands the slow intravenous injection of 100–300 milligrams of nicotinic acid in 20–60 c.c. of normal saline solution repeated twice weekly for three weeks has proved a dramatic success, and as it is harmless, it is always worth trying. Different remedies suit different people; Aminophylline or Cardophyllin $1\frac{1}{2}$ –3 grains 3 times daily is often successful; erythrol tetranitrate, $\frac{1}{2}$ –1 grain in a neutral base (it is explosive by itself) twice or three times a day, and increased if necessary, suits many patients—the vasodilator effect begins after about half an hour, and continues for 8–10 hours; the bromides, especially ammonium bromide, the barbiturates, and nicotinic acid by the mouth may be useful in some cases, but not in others.

Surgical procedures with the object of cutting the sensory nerves from the heart have been numerous, one of the most successful being paravertebral injection of alcohol into the upper dorsal sympathetic ganglia or into the stellate ganglion, but these operations are for experts. Total thyroidectomy has also been reported as successful when it made the basal metabolic rate fall below minus 20.

If, for some strong reason, a patient anticipates undergoing an exertion that would normally bring on an anginal attack he should prime himself immediately beforehand with one or two tablets of nitroglycerin.

As an important part of treatment is to prevent attacks, it need hardly be said that patients who get attacks on the slightest provocation must be kept in bed.

CORONARY THROMBOSIS.—

Although this is apt to come on during sleep, when the flow of blood through the atheromatous coronary arteries is sluggish, it may occur at any time, such as when a successful parliamentary candidate is replying to a toast at a dinner given in his honour.

The attack may be mild, severe or instantaneously fatal. The mild attack is dangerous because it may be diagnosed as something else, such as indigestion or intercostal neuralgia or the patient may think it is not worth reporting to a doctor. A more severe attack will frighten the patient, so the doctor is usually asked to attend, but even so, the patient, especially if he has vomited, may be apt to stress the abdominal symptoms, and the abdomen has even been opcoed.

A typical severe attack occurs while the patient is resting or asleep; he feels a sudden retrosternal pain which rapidly becomes agonizing, he is short of breath, cold, clammy and collapsed and is often extremely restless; after a while the pain may become less but it remains severe; relief may follow vomiting or the passage of a stool or flatus. The appearance of the patient is both alarming and characteristic, and is best summed up in the one word "grey." The pulse may be rapid or slow, and there may or may not be extrasystoles; if the pre-attack blood-pressure is known it will be found to have gone down.

Some years ago in Bangalore the writer was called out urgently in the middle of the night to see an old Hindu gentleman with severe haematemesis from a duodenal ulcer and prescribed morphia, haemoplastic serum and calcium. The haemorrhage stopped, but the next night the writer was again called out even more urgently; the patient had had a coronary thrombosis. In spite of a spirited inclination to disobey orders the old gentleman survived both catastrophies and lived for several happy and busy years afterwards.

Treatment.—The treatment of coronary thrombosis is to give the patient morphia or Omnopon gr. $\frac{1}{2}$ immediately and to put him in bed, repeating the injection at hourly intervals until the pain and restlessness are relieved.

If the patient is unconscious when first seen, an injection of adrenaline $\frac{1}{2}$ –1 c.c. of 1:1,000 solution may improve matters; this treatment is recommended by Levine, who has also found it the best treatment for the heart block that sometimes occurs in the early days. Incidentally, heart block indicates thrombosis of the right coronary artery instead of the much more usual descending branch of the left.

To understand further treatment it is necessary to understand how the patient may die, if he survives the initial attack. During the first few days, death may occur from ventricular fibrillation or from heart failure. The former may sometimes be prevented by quinidine,

gr. 3-5 t.d.s. Fibrillation may occur if the thrombosis spreads, so heparin may be given intravenously, 5% in normal saline, in the dosage of one milligram per kilo of body-weight (i.e., one-tenth of a grain or 6 milligrams per stone of body-weight). Dicoumarin (U.S.A., dicumarol) may be given as this also prevents clotting of the blood in a similar way, but takes 24-48 hours to act; the dose is 300 milligrams in a gelatin capsule by mouth on the first day and 200 milligrams on the second day; the effect of the drug lasts for several days and the subsequent dosage is controlled by the clotting time, which is kept at about 35 seconds. Theoretically, these drugs should be of great value but more research is needed to make their use on a large scale safe.

Heparin is expensive, but this is not such a drawback as would at first appear, because most of these patients are well-to-do and have done themselves well. Once a clot has formed it cannot be unmade nor can the tissues supplied by the thrombosed vessels be brought back to life if they have already died, but the clot can be prevented from increasing, which is what an immediate injection of heparin should do, and this prevention can be maintained by means of dicoumarin. A further interesting use of dicoumarin may be prophesied, namely, when a patient has survived one attack of coronary (or any other) thrombosis it may be possible to prevent further attacks for the rest of his life by giving him a dose of dicoumarin once or twice a week. The dosage *must* be regulated and checked by observing the clotting time, and if the patient should meet with an accident, fresh-blood transfusion (about a pint) will restore the clotting power of the blood.

Heart failure is guarded against by complete rest; if it occurs, bleeding may be tried, coupled with a single intravenous dose of $\frac{1}{16}$ grain of Digoxin or strophanthin.

If the patient escapes these early dangers there are still others; the infarcted area of ventricular wall becomes covered with blood clot on its inner aspect, so large or small emboli may separate and lodge in the brain or other organs, with harmful but seldom fatal results; haematuria suggests emboli in the kidneys. Far more serious is the risk of rupture of the heart, a risk which is at its greatest during the second week, after which it diminishes until at the end of the eighth week the danger may be said to be over.

It will thus be seen that these patients must be capably nursed, must be kept strictly in bed for at least eight weeks, that the risk of straining at stool must be guarded against by an enema every other day and that diet must be light and digestible. The possibility of a permanently weakened heart and of further attacks makes the ultimate outlook precarious, but Lewis says "Of those who convalesce well, some return to active lives for periods of five or more years and to live on in comparative activity for periods up to ten or occasionally fifteen or more years."

As already indicated, the newer drugs may improve the outlook very greatly.

The chief serious conditions to be distinguished are dissecting aneurysm, lobar pneumonia, spontaneous pneumothorax, gall-stone colic, diaphragmatic hernia, perforated or ruptured viscus, diabetic coma (coronary thrombosis is not uncommon in diabetics) and spontaneous interstitial emphysema of the lungs, due to rupture of an air sac in the lung.

The electrocardiographic changes are rather beyond our present scope, but an experienced and accurate cardiologist can both diagnose coronary thrombosis from the electrocardiograms, and can tell which main artery is affected. Lead IV appears to be of particular value.

CARDIAC NEUROSIS.—This is a condition, formerly and unfortunately called pseudo-angina, which occurs in younger, neurotic people, often females who smoke too much and have a high blood-pressure, or it may occur in patients who are out of training and begin taking violent exercise. The characteristic of the pain is that it lasts for several hours, during which the patient walks about in an agitated manner, often giving details of its character and progress. A careful examination is required and treatment, when the diagnosis is certain, is by reassurance, bromides and perhaps a holiday.

CARDIAC ASTHMA (acute oedema of the lung).—This chiefly affects men aged between 50 and 70 years who are suffering from hypertension, and usually occurs at night. Occasionally, kidney disease is present—renal asthma.

A moment's thought will show that the two sides of the heart must pump out exactly the same quantity of blood every minute, otherwise one circuit will become engorged and the other relatively empty. It is thought that in acute pulmonary oedema the left side of the hypertensive heart becomes temporarily fatigued, so the right pumps out more blood and the pulmonary system becomes over-charged. Attacks tend to become worse as time goes on.

Treatment.—Sit the patient up in bed, give a quarter of a grain of morphia, and if there is great distress bleed him of a pint of blood. These patients should never be allowed to lie flat in bed.

HEAT

The range of thermotherapy has been extended in recent years by the many forms of radiant-heat applicators. It should be considered under the following heads: (1) Moist Heat, (2) Dry Heat, and (3) Radiant Heat.

(1) MOIST HEAT.—

POULTICES.—These are dirty, sticky and very septic applications, and should never be used for suppurating conditions. When moist heat is desired the antiseptic fomentation is far more satisfactory. The only exception is Kaoplasma (Collobell), which is made with the purest colloidal kaolin, containing 1 part in 4,000 of colloidal silver; it is ideal for the application of moist heat, and it is not only free from bacteria, but no micro-organism can grow on it.

It comes away clean, but adhering particles can be removed with water.

FOMENTATION OR STUPE.—A small towel is placed across the bottom of a basin, four layers of thick flannel or two layers of old blanket are laid on the towel, and boiling water poured over the whole. The towel is now lifted up and used as a wringer, by having the two ends twisted in opposite directions. The flannel is carried in the wringer to the patient and applied as hot as can be borne, the wet flannel being covered with four layers of dry flannel, cotton-wool, oilskin or paper. The fomentation must be applied every ten or fifteen minutes, and in no case should it be left on until cold or clammy.

TURPENTINE STUPE.—This is prepared by stirring half an ounce of turpentine into a pint of boiling water until emulsified.

ANTIPHLOGISTINE, a proprietary preparation, expensive but effective. It contains Fuller's earth, glycerin and essential oils. It is heated by placing its container in a pot of boiling water, and so heated that it is applied at a temperature of 115° F. in a layer a $\frac{1}{2}$ inch thick, and then covered with a pad of cotton-wool. It should be reapplied in 24 hours. It has the disadvantage of interfering with the examination of the part.

The volcanic muds of Italy are useful and have the power of retaining heat for a remarkably long time.

VAPOUR BATHS.—The Russian bath is a chamber filled with steam at a temperature of about 120° F. in which the patient sits for about 20 minutes. The Berthe bath is a wooden box in which the patient sits, but with his head outside, and the steam is at the same temperature. The Berthollet bath consists of a number of light metal cases made to fit various parts of the body, the steam being admitted from a central cylinder.

(2) **DRY HEAT.**—This includes the Turkish bath and the Harrogate hot-air bath. The Harrogate hot-air bath consists of a number of cases adapted to particular parts of the body; inside the cases are a number of wires; the passage of a current through these wires produces a dry heat which may be as high as 500° F.

(3) **LUMINOUS RADIANT HEAT.**—The electric-light bath is fitted with 20–30 incandescent lamps and a metal reflector. The patient sits in the bath completely naked; the time of exposure is about 12 minutes for a stimulating effect and about half an hour for diaphoresis, which is more readily induced than by any other method.

The Dowsing radiant-heat apparatus is only let on hire and cannot be purchased. The heat can be given to any special part or to the whole body, the temperature being accurately regulated up to 450° F.

BERGONIE BATH.—This consists of a full-length cabinet, the patient's head being outside. Large electrodes are placed on the back, abdomen and thighs, and held in position by heavy

sand-bags. A rhythmical faradic current causes contraction of the muscles against the weights, thus exercising them without fatigue, at the same time with free perspiration. It is used for the treatment of obesity. The Turkish bath on the other hand generally causes an actual increase in weight.

Radiant heat is especially useful in the treatment of chronic rheumatism, arthritis (infected or otherwise), gouty neuralgia and sciatica. The preliminary application of radiant heat to a joint that is to be manipulated is of great value, as it appears to soften the adhesions.

HEAT-STROKE

This is divided into heat-exhaustion and heat-apoplexy, which includes sunstroke. The former, which is much the commoner, is caused by too much sweating and the latter by too little.

HEAT-EXHAUSTION.—This is due to excessive loss of water and salt in the sweat; because of the loss of salt the osmotic pressure of the body fluids drops below that necessary for retaining an adequate amount of water. A man doing hard manual work in a hot climate may lose as much as four gallons of sweat in 24 hours. This means that he not only loses a great deal of fluid, which must be replaced, but that he loses two of the total 5 ounces of available salt in his body. It is quite obvious that this must be replaced or he will die. Incidentally, the intake of salt on an ordinary diet is about half an ounce a day, adequate for a temperate but not for a hot climate. Should the reader happen to be sweating as he reads this and licks the back of his hand, he will understand why salt replacement is essential (Baxter).

Symptoms.—The patient feels "out of sorts," he is almost invariably constipated, and often has cramps in the abdomen (sometimes diagnosed as acute abdomen, especially if he has vomited); the pulse is feeble, the blood-pressure low, and the temperature generally about normal.

Treatment.—Replace the missing salt and keep the patient at rest in as cool a room as possible. A pint of Rogers's hypertonic saline solution should be given intravenously, and several pints of normal saline solution given the patient to drink; he should also be given a dozen salt tablets to swallow. When he has recovered somewhat, he is again given normal saline solution to drink, up to four gallons (32 pints) being required in 24 hours. This is later reduced to about two gallons, but this high level, together with the intake of $1\frac{1}{2}$ –2 ounces of salt, must be continued when the patient returns to work. Prophylaxis is carried out by the same means.

Eastern races, because of inherited immunity, are much less liable than Europeans to heat-exhaustion; they also wear fewer clothes, work less vigorously and have less salt in their sweat.

HEAT-APOPLEXY.—As already observed this is due to too little sweating, but this remark needs some amplification. The body maintains its temperature by two chief methods, which may be

rather inaccurately compared to air-cooling and water-cooling a motor-car engine. When the outside air is below 98.4° F. the body temperature is regulated largely by the dilatation and contraction of the capillary blood-vessels of the skin; these expand when heat is to be radiated out of the body and contract when it is to be kept in; once the outside temperature rises above that of the body it is obvious that this "dry" method is of no avail, so sweating comes into play, and is, indeed, the only method by which the temperature of the body can be kept below that of the surrounding air; if the reader will wave his hand about he will see that moist cooling is much more effective in moving than in still air.

We find, therefore, that the cause of heat-stroke is a dry skin, and it is easy to understand that the condition is common among those who are already feverish because it is while the temperature is rising in any disease that the skin becomes hot and dry.

Those who have not read *The Agra Double Murder* should do so if they get a chance, not only for its literary and dramatic qualities but because it gives a wonderful description of how, during the Agra hot weather, a pair of illicit lovers murdered the lady's husband with a "heat-stroke mixture" containing belladonna.

The symptoms of heat-stroke are hyperpyrexia, dry skin and delirium.

Treatment.—This is simple, but must be immediate if it is to be successful; time should not be wasted in taking the patient to hospital if it is far away.

- (a) Strip the patient, put a sheet over him, pour water over it and get as strong a current of air on it as possible, either with fans, hand punkahs or a natural breeze.
 - (b) Do a lumbar puncture if possible.
 - (c) Maintain the wetness of the sheet and the current of air until the patient's temperature is below 102° F.
 - (d) Keep the patient in as cool a place as possible.
 - (e) Maintain precautions for at least a week, as the heat-regulating mechanism is often unstable.
 - (f) If there is any possibility of the patient's having malaria, give five grains of quinine intravenously, and repeat after an hour.
- Many cases diagnosed as "heat-stroke" are really suffering from cerebral malaria.*

Packing in ice is said not to be so effective because of the vaso-constriction it causes; it is also extremely unpleasant—the writer speaks from experience.

SUNSTROKE.—The existence of this condition is now debated, the old idea that some mysterious (possibly infra-red) ray from the sun penetrated the skull and caused inflammation of the brain being openly denied, and the virtue of the topi being held to be its shadiness, not its sun-proof qualities. While partly agreeing with the modern view, the writer is not convinced of its entire truth and so far as he himself is concerned, he continues to wear a topi when out in the hot sun for hours at a time.

HELIO THERAPY

By C. W. SALEEBY, M.D., F.Z.S., F.R.S.E.

If heliotherapy treatment is being carried out at a hill station in India, the patient should first become acclimatized to the high altitude and accustomed to open-air treatment before insolation is begun.

The time of the day is always important, and this is especially the case in India; the early morning is by far the best as the air is then relatively cool.

Exposure to the sun's rays is begun very gradually, at first to a small area of body surface, which is extended daily. Further, the exposure should not be continuous but with short intervals, for example:

	<i>Part of Body Surface Exposed</i>	<i>Number of Times Exposed</i>	<i>Period of Exposure</i>	<i>Interval between Exposures</i>
1st day	.. Feet	3	5 min.	5 min.
2nd day	.. Feet	3	10 min.	5 min.
	.. Legs	3	5 min.	5 min.
3rd day	.. Feet	3	15 min.	5 min.
	.. Legs	3	10 min.	5 min.
	.. Thighs	3	5 min.	5 min.
4th day	.. Feet	3	20 min.	5 min.
	.. Legs	3	15 min.	5 min.
	.. Thighs	3	10 min.	5 min.
	.. Abdomen	3	5 min.	5 min.
	.. Feet	3	25 min.	5 min.
5th day	.. Legs	3	20 min.	5 min.
	.. Thighs	3	15 min.	5 min.
	.. Abdomen	3	10 min.	5 min.
	.. Thorax	3	5 min.	5 min.
	.. Feet	3	30 min.	5 min.
6th day	.. Legs	3	25 min.	5 min.
	.. Thighs	3	20 min.	5 min.
	.. Abdomen	3	15 min.	5 min.
	.. Thorax	3	10 min.	5 min.
	.. Feet	3	35 min.	5 min.
7th day	.. Legs	3	30 min.	5 min.
	.. Thighs	3	25 min.	5 min.
	.. Abdomen	3	20 min.	5 min.
	.. Thorax	3	15 min.	5 min.
	.. Feet	3	40 min.	5 min.
8th day	.. Legs	3	35 min.	5 min.
	.. Thighs	3	30 min.	5 min.
	.. Abdomen	3	25 min.	5 min.
	.. Thorax	3	20 min.	5 min.
	.. Feet	3	45 min.	5 min.
9th day	.. Legs	3	40 min.	5 min.
	.. Thighs	3	35 min.	5 min.
	.. Abdomen	3	30 min.	5 min.
	.. Thorax	3	25 min.	5 min.
	.. Feet	3	50 min.	5 min.
10th day	.. Legs	3	45 min.	5 min.
	.. Thighs	3	40 min.	5 min.
	.. Abdomen	3	35 min.	5 min.
	.. Thorax	3	30 min.	5 min.

After the 10th day the head is also exposed and the periods gradually increased, in accordance with the toleration of the patient until on the 15th day the whole body is exposed 4 times, the period of exposure being 30 minutes and the interval between exposures being 15 minutes.

The exposure should be shorter during the hot weather than in the cold weather. Symptoms of an overdose include a rise of temperature with increased pulse and respiration, malaise, vertigo and insomnia. In order to avoid these, the reaction of each individual case should be carefully studied and no departure allowed from the systematic increase of dosage. There are wide variations in individual tolerance and each individual must be studied and treated accordingly.

Cases suitable for heliotherapy treatment:

- (1) Surgical Tuberculosis.
- (2) Rickets.
- (3) Convalescents from Acute Conditions.
- (4) Anaemia.
- (5) Chronic Infective Conditions.
- (6) Pulmonary Tuberculosis, early cases.
- (7) Many forms of Skin Disease, including Lupus.

Contra-indications:

- (1) Pulmonary Tuberculosis, advanced cases.
- (2) Advanced Cardiac Disease.
- (3) Arteriosclerosis.
- (4) Cases with Fever and Toxaemia.

HEMIPLEGIA—See Nervous System.

HEPATITIS, AMOEBIC, AND LIVER ABSCESS

In only about 6% of cases is there either a history of dysentery or the finding of amoebae in the stools.

Adult European males are affected more commonly than anyone else. The diagnosis is suggested by a consideration of the history and symptoms supported by intercostal tenderness, hepatic enlargement, X-ray examination, moderate leucocytosis and evening fever, and confirmed by the therapeutic test in which symptoms and fever subside after about three days' treatment with emetine. In the case of abscess, confirmation is, of course, given by exploratory puncture.

Once upon a time the writer saw a wizened, cachectic-looking middle-aged European sitting on the verandah of his consulting room, he invited him in and asked him what the trouble was. The patient said that he had just returned from a sea voyage which he had taken for his health and that the doctor on board the ship had told him he had neurasthenia. The patient complained of severe pain after food and said he thought his gall-bladder was wrong. He looked as though he had cancer, was tender over the stomach,

the lower edge of the liver was palpable, and the liver was enlarged and very slightly tender. There was no leucocytosis, but there was a slight evening rise of temperature; the patient was constipated and the stools showed no amoebae or cysts. A barium meal showed no ulceration or growth of the stomach. After two or three days of intensive research there was no further diagnostic indication and no improvement in the patient's condition. The writer, therefore, explored the liver with a needle and drew off 22 ounces of anchovy-paste pus. The patient was put on emetine and an exploration a week later was negative; he has remained well ever since.

On another occasion the writer was sent for to see a Ruling Chief of his acquaintance whom he had not seen for about a year and was shocked at the change in his appearance. Many physicians were seated round the old gentleman's bed and the writer was invited to explore the patient's liver. He examined the whole patient, found the hard lower edge of the enlarged liver, a weakly-acting heart and a systolic blood-pressure of only 70. He did *not* explore the liver and the patient was dead within 48 hours. He had cancer of the liver, and if the exploration had been made he would have died even sooner and the writer would have been blamed. Moral: avoid a desperate operation on a moribund patient, especially if he is famous.

TREATMENT OF AMOEBIC HEPATITIS.—This is by emetine, the dose being one grain a day for eight days, followed by a four days' interval and then four more daily injections of one grain. The writer often gives the drug by intravenous injection; in this case a half-grain dose should be tried first, and if there is no nausea or discomfort one grain is given in 2 c.c. of normal saline fairly slowly (about 30 seconds) once a day. The drug appears to be more effective and the injection is painless both at the time and afterwards. A course of 12 injections will often cure the disease, especially if the stools are negative.

TREATMENT OF LIVER ABSCESS.—This also is by emetine injections as above, and aspiration. This is carried out as follows.

- (a) If, as nearly always happens, the abscess is in the right lobe of the liver disinfect the skin and choose a place in the 8th or 9th intercostal space in the right mid-axillary line.
- (b) Raise a subcutaneous wheal with 2% Novocain at the selected spot and then thrust in the anaesthetizing needle to a depth of about two inches, injecting Novocain as the needle goes in and is withdrawn.
- (c) Wait about 3 minutes for the Novocain to act.
- (d) With the point of a cataract knife make a small cut in the centre of the wheal.
- (e) Through the small incision insert a wide-bore needle or, better, the trocar and cannula of a Potain's aspirator.
- (f) Point the needle or trocar in a slightly upward and forward direction, and *never push it in more than 3½ inches.*
- (g) Apply suction with a syringe or aspirator and withdraw pus

until the patient feels uncomfortable or faint. It is generally considered unwise to aspirate more than about two pints, or 1,000 c.c., at one sitting, but it depends entirely upon the condition of the patient. If the pus is very thick inject some sterile normal saline into the abscess cavity to thin it down.

- (h) If pus is not found withdraw the point of the needle or trocar until it is subcutaneous and try again in a more backward, forward, downward or upward direction, according to where it is thought the pus may be. (A previous X-ray picture may help.)
- (i) Three attempts are permissible, and if they have been carefully planned but have not struck pus there is probably no large collection at any rate. It is important to draw the needle out as directed in (h) above, as if the direction is changed while it is in the liver the latter will be torn, possibly with fatal results.

The patient is given emetine as above, and subsequent treatment depends upon how he fares. If the temperature goes down and keeps down, and symptoms disappear, one aspiration may be sufficient, although it is always advisable to try once more after about a week to make sure no pus is left. If, however, as sometimes happens, especially in cases of long standing, the fever rises again, aspiration will be needed again and may have to be repeated many times; if after 20 or 30 aspirations there is no sign that the abscess is diminishing drainage through a de Pezzer's catheter or even open operation will be required. Since the advent of chemotherapy, the 50% mortality formerly attending open operation has greatly diminished, but it is of the utmost importance:

- (a) To prevent secondary infection by observing strict asepsis at the time of operation and by chemotherapy afterwards.
- (b) To suture the layers of the pleura to the diaphragm before the abscess is opened, or to secure their adhesion by making an incision four days before the operation, packing with iodine gauze for a couple of hours and then with plain gauze.
- (c) To strike pus with a needle immediately before the operation, to leave the needle in place and to follow it down when opening the abscess.

HEPATIC DISTURBANCE

The following Liver Mixtures are popular; glucose should also be given freely.

R Tr. Podophyllan ..	℥ 5	R Tr. Euonymun. ..	℥ 30
Amm. Chlorid. ..	gr. 10	Vin. Pernani ..	℥ j
Liq. Ext. Euonymin. ..	℥ 10	Syrup. Zingib. ..	℥ ss
Tr. Nuc. Vom. ..	℥ 2	Inf. Calumbae ad ..	℥ j
Spt. Chloroform. ..	℥ 10	Twice daily in a little water.	
Aquam ad ..	℥ j		
R Acid. Nit.-Hyd. Dil. ..	℥ 8	R Acid. Nit.-Hyd. Dil. ..	℥ 10
Tr. Nuc. Vom. ..	℥ 5	Sod. Sulph. ..	℥ j
Liq. Ext. Taraxaci ..	℥ ss	Liq. Strychninae ..	℥ 4
Aquam Chloroformi ad..	℥ j	Spt. Chloroform... ..	℥ ss
t.d.s.		Aquam ad ..	℥ j

Biliary Disturbance with Lithiates in the Urine

R. Sod. Sulph. ..	..	..	..	..	gr. 20
Sod. Pot. Tart.	..	..	..	..	ʒj
Tr. Nuc. Vom.	..	..	..	..	ʒij 10
Inf. Buchu ad	..	..	..	..	ʒj

HERNIA

Unless there are good reasons to the contrary, the treatment of hernia is by operation. Contra-indications are:

- (1) Unwillingness of the patient.
- (2) Lack of proper facilities.
- (3) A history of two or three operative failures.
- (4) Hernia of such a size that it cannot be conveniently returned to the abdomen (as a French priest with a colossal hernia once remarked to the writer when he advised against operation, "Yes, Yes, one cannot put Paris into a bottle!")
- (5) Serious disease of another kind, such as bronchitis, tubercle or Bright's disease.
- (6) Old age, especially when coupled with a long and uneventful history.
- (7) A large umbilical hernia in a large, fat woman, because the operative mortality is high.

In infants, the best treatment of inguinal hernia is to operate; with sulphathiazole powdering and an Elastoplast dressing the risk of infection from a wet napkin is very slight, and the operation is comparatively simple, because in infants "if you treat the sac you treat the hernia."

INGUINAL HERNIA OPERATION.—Outbreaks of discussion about the best method occur from time to time, but from a pretty wide experience over many years the writer is convinced that the really important points about the operation are:

- (1) High ligation of the sac.
- (2) Absolute haemostasis and asepsis.

If these matters are conscientiously attended to the first operation is likely to be successful, so it will also be the last. The writer's routine for oblique inguinal hernia is as follows:

The anaesthetic may be intravenous (one gramme of Cyclonal Sodium repeated if required), spinal, general or local.

- (a) Confirm that you are operating on the correct side.
- (b) Immediately before making the incision put the tip of your finger on the spine of the pubis, which can always be felt. The outer pillar of the external abdominal ring is attached to it, so the ring itself lies immediately above and can be felt pointing upwards and outwards.
- (c) Make the incision upwards and outwards immediately over the ring.
- (d) Cut through the fat and separate it gently from the external oblique.

- (e) Split the external oblique in the direction of its fibres until the internal oblique is clearly seen.
- (f) Dust the wound with Cibazol or a similar powder.
- (g) By blunt dissection separate the cord from its bed, pass a ribbon of gauze behind it and put a haemostat on the ends of the gauze so as to make a loop.
- (h) Starting as high up as possible pick up the membranous tissue containing the sac and attached to the front of the cord, if necessary dividing the cremaster muscle, which springs from the internal oblique.
- (i) With the other finger and thumb, feel the cord so as to ascertain the position of the vas deferens with certainty; it feels like a piece of catgut and is quite unmistakable.
- (j) Tell the assistant to pick up the membranous tissue on his side of the cord, the point of his forceps being about a quarter of an inch from yours.
- (k) Lift the tissue and go on spicking it with a pair of scissors until an unmistakable hole appears, which means that the sac is open. "If you are not sure whether you have opened the sac you have not opened it" (Rutherford Morison).
- (l) Slightly enlarge the opening in a downward direction and put your left index finger inside the sac as far as the fundus. (If the sac is large, more than one finger may be used.)
- (m) With the assistant holding the cord between the fingers, draw the sac away from it by means of the finger inside it. This manoeuvre makes the dividing line between the cord and the edge of the sac very clear.
- (n) Snip with scissors, or gently strip off with gauze, or with scissors used as a blunt dissector, the membranous tissue holding the sac to the cord.
- (o) Strip the sac off the cord as high up as possible; a ring of fat generally marks the neck.
- (p) Tell the assistant to retract the internal oblique, and separate the sac from it as high as possible. (A recent modification is to cut across the fibres of the internal oblique for about half an inch and to join them later behind the cord.)
- (q) Make sure that the neck of the sac is empty: if it is not, it is often a help to put the patient temporarily in the Trendelenburg position.
- (r) With the assistant pulling on the sac, transfix the neck as high as possible with a piece of medium silkworm gut or nylon, and tie it off tightly.
- (s) Cut across the sac about half an inch distal to the ligature and let the stump spring back into the abdomen.
- (t) Dust the wound with Cibazol or a similar powder.
- (u) This step is subject to variation.
 - (1) In children, stitch up the external oblique with fine catgut and close the wound. Many surgeons do only this in adults too.

- (2) If the internal oblique has been cut across (*see (p) above*), stitch the divided ends together with fine silkworm gut or nylon behind the cord, sew up the external oblique with fine catgut, and close the wound.
- (3) (Bassini) Tell the assistant to pick up the internal oblique in toothed dissecting forceps and to hold the cord forward with the gauze ribbon; draw the outer lower edge of the divided external oblique downwards and outwards until the glistening ridge of Poupart's ligament is clearly seen.
- (4) With the left index finger locate the pulsating femoral artery where it passes under Poupart's ligament with the vein to its inner side and the nerve to its outer side.
- (5) Pass a silkworm gut or nylon suture through the internal oblique fairly high up; pass the stitch behind the cord and then through the ridge of Poupart's ligament, being careful not to prick the femoral artery or vein, which lie immediately behind.
- (6) Put in two or three such interrupted stitches until the spine of the pubis is reached. At the upper end, the new internal ring should accommodate the tip of the little finger; do not put a stitch above the cord or there is danger of strangulation.
- (7) Dust with Cibazol or a similar powder, sew up the external oblique with fine catgut, make sure that haemostasis is perfect, and close the wound.

STRANGULATED HERNIA.—Reduction may be gently attempted if the strangulation is less than two hours old; operation is essential if the attempt fails or the condition has lasted longer than two hours.

The dangers of reduction are as follows.

The bowel may be ruptured in the process, it may be gangrenous or it may be reduced *en masse*, in which case symptoms persist. A further danger is that the fluid in the sac (there always is some) is often highly infective from transudation of organisms through the wall of the strangulated bowel. Strangulated omentum is dull to percussion, bowel is resonant, and splashes can often be heard with a stethoscope, but bowel may be nipped at the neck of an omental hernia.

Operation.—The incision is made over the bulging inguinal canal, each layer being carefully separated from the one below until the sac is reached. When the sac and external oblique are clearly seen, slit up the latter, a hernia director or a small spatula being inserted into the inguinal canal to protect the sac.

Opening the sac must be done with the greatest care or the bowel may be opened too. The surgeon and the assistant should pick up "pinches" of sac in dissecting forceps without teeth, the surgeon nicking each piece picked up until the escape of fluid and the sight of shiny bowel shows that the sac is open. All fluid must be carefully

absorbed on swabs, and Cibazol powder freely dusted around. When the sac is open, catch the edges with haemostats, and with a pair of blunt-pointed scissors (Mayo's are the best) carefully slit up the sac until the constricting ring is reached. No attempt to draw out or replace bowel must be made until the ring has been divided and the bowel carefully examined.

When the constricting ring is reached (it is generally near the internal ring), a surgeon with a very delicate touch may insert a finger and carefully cut down on it, but this method is not recommended for general use; it is too dangerous for the surgeon. The hernia director is better, and may be used instead of the finger, the ring being carefully nicked with the knife from the outside until it gives.

While the surgeon is dividing the obstruction the assistant should gently hold the herniated bowel in a piece of gauze, otherwise the bowel may suddenly slip back into the abdomen.

When the ring is divided draw the bowel well down and have a good look at it, particularly at those portions which were nipped by the constriction, because it is here that a small patch of gangrene may be present. Shiny bowel will survive. If the bowel can be returned to the abdomen and the patient's condition is good proceed as in an ordinary hernia operation.

If the bowel is gangrenous, excise it and anastomose if the patient's condition and the skill of the surgeon permit, otherwise excise the gangrenous area, draw the cut ends of living bowel out of the wound and tie a Paul's tube in each.

UMBILICAL HERNIA.—

In babies these generally cure themselves with help of Elastoplast over the infolded skin, but if the hernia persists up to the age of 18 months or two years operation is required. In these cases the writer makes a longitudinal crescentic incision enclosing the umbilicus, which is not sacrificed because a child with no umbilicus is likely to be teased about it and develop a "complex." The sac is dissected out, the neck ligated, the sac removed and the rectus muscles stitched together; a subcuticular stitch gives an elegant finish to the operation.

For Ventral Hernia in adults a similar operation may be performed if the recti are not widely separated, but if, as is usual, they are, Mayo's operation is the best.

- (a) Make a curved transverse incision above and below the hernia, enclosing it.
- (b) Dissect off the skin and subcutaneous tissues until the neck of the sac is reached.
- (c) Empty the sac or make sure that it is empty and cut round the neck, removing sac, fat and skin in one piece and carefully catching the deep peritoneal edge of the neck with haemostats as the incision progresses.
- (d) Separate the neck from the rectus sheath aponeurosis and make a transverse incision in the latter as far as the inner

edges of the rectus muscles. If there are dense adhesions round the neck of the sac work from the sides towards the mid-line.

- (e) Carefully sew up the peritoneal edges of the sac in a transverse direction.
- (f) Take three (or more according to the size of the gap) silkworm-gut stitches on curved cutting needles, and insert them at equal intervals near the upper or lower edge of the aponeurosis (see Fig. 25).

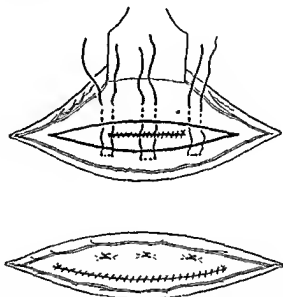


Fig. 25 —Method of sewing up rectus aponeurosis in a large ventral hernia.

- (g) Pass one of the needles under the opposite flap for about half to one inch, bring it out, remove the needle and put a haemostat on the end of the suture.
- (h) Pass the other end of the same suture similarly about a quarter of an inch from the first.
- (i) Tie the ends together.
- (j) Do the same with the other sutures; one flap now rests snugly beneath the other, forming a double layer where previously there was none.
- (k) *Stitch the free edge of the superficial flap to the aponeurosis beneath it and close the wound.*

Strangulated ventral hernia is treated similarly if the gut is viable, otherwise anastomosis is done or Paul's tubes are used. Thrombosis of a mesenteric vein supplying the gut in a ventral hernia is not unusual. This desperate condition may be treated by resection of the affected gut and the administration of heparin. In a case the writer operated on in Baghdad many years ago the whole ileum was

disease may be acquired among the highly insanitary conditions so typical of "health resorts" in the hills.

If the stools show dysentery bacilli or a bacillary exudate, treatment is as for bacillary dysentery.

(2) A disease resembling those cases of infective hepatitis which sometimes occur without jaundice.

(3) True "Hill Diarrhoea" or "Monsoon Diarrhoea," which in the writer's opinion is akin to sprue, but differs from it in being milder, and often disappearing within a few weeks or when the patient returns to the plains. It nearly always begins during the rains, most commonly soon after the patient's arrival in the hills, but not always; for instance, the writer had an attack nearly a year after arriving in Maymyo, Burma, lived there for three years afterwards but did not have a recurrence for 20 years, when he had a slight attack in Quetta during some unseasonable rain in that normally very dry place.

SYMPTOMS.—Anorexia, lack of energy, flatulence and the passage of large, pasty, semi-solid stools between about 5 a.m. and 10 a.m. form the characteristic picture.

TREATMENT.—The following "Simla mixture" is most successful:

B Bismuth. Salicylat.	..	..	gr. 20
Liquor. Hydrarg. Perchlor. 1:1,000	..	..	5j
Mucilag.	..	..	9ss
Aq. Menth. Pip. ad	..	..	3j
3j. t.d.s.a.c.			

In addition, the patient may be given a daily injection of 2 c.c. liver extract, half a tablet (25 mg.) nicotinic acid and one tablet (2 mg.) of riboflavin by the mouth three times a day after food, washed down with an ounce of the following:

B Acid. Hydrochloric. Dil.	}	..	..	aa 3j
Glycerin. Pepsini		..	..	3j
Aq. Menth. Pip. ad	..	..	..	3j

NOTES ON HILL STATIONS

HILL STATIONS AND HEALTH RESORTS	ALTITUDE FEET	RAINFALL INCHES	MEAN TEMPERATURE DEGREES	PREVAILING WINDS	HUMIDITY
Almora ..	5,494	42-40	..	..	..
Aijal (Lushai Hills).	3,700	..	..	..	..
Bhum Tal	..	..	..	..	..
Bangalore	3,021	35-10	74-3	{ S54°W* S39°W	{ 68† 75 }
Coonoor	6,000	66-64	60	..	..
Cox's Bazar .	..	..	..	..	..
Darjeeling	7,432	125-44	53-1	{ S75°W* S31°E	{ 86† 85 }
Dalhousie .	7,687	83-99	..	..	..
Dehra Dun	2,233	83-66	70-1	{ S83°W* S6°E	{ 64† 70 }
Dras ..	10,059	21-22	36-1	N78°W	77

* In the case of winds, the values in bold figures are derived from 10 and 16 hours' observations.

† In the case of humidity, the figures in bold are true daily means, and those in plain figures are

AND HEALTH RESORTS

REMARKS

Has a great reputation as a resort for cases of tuberculosis of the lungs, and people flock there from all parts of India. It has a low rainfall. From Kathgodam, the terminus of the R. and K.R., there is a lorry and motor car service *via* Raniket; by the former the journey takes 9 and by the latter 6 hours. The accommodation for Europeans is very limited, and many of the Indian houses are said to be badly infected with tubercle. Rocky soil, good natural drainage, little vegetation. Season—April to October.

Distance, 430 miles from Calcutta to Silchar by rail, and 111 miles by road from Silchar. Journey from Silchar (a) by road—111 miles, 8 marches; furnished Inspection Bungalow at each stage; (b) by boat—country boats can be obtained from the government contractor of Silchar and Ayal or by direct arrangement with the Superintendent, Lushai Hills.

9 Miles from Kathgodam, the terminus of the R. and K.R. There is ample hotel and boarding-house accommodation, lake fishing and shooting. The unenviable reputation, as regards sanitation and fever, which the place had a few years ago, has now been rectified. Season—April to October.

Very healthy, with a low death-rate, and cool, pleasant climate. Many European pensioners retire there.

The Pasteur Institute of Southern India. It is 22 miles from Mettupalayam and 10 miles from Ootacamund. The annual mean temperature is 60° with an extreme variation not exceeding 15° either way. Flowers, fruits, and vegetables grow in profusion all the year round. Rainfall is well distributed throughout the year, but heaviest in the north-east Monsoon.

A subdivision in the district of Chittagong, is a well-known health resort. The surrounding country is hilly and very picturesque and good shooting is obtainable in the neighbourhood. A great attraction is the excellent sea-bathing obtainable on a fine sandy beach. The Dak Bungalow is situated on a small hill overlooking and about five minutes' walk from the sea.

Very damp with a rainfall of 125 inches, principally from June to September.

A very pretty, moderately sized hill station built on three separate hills, but rather difficult of access. Season—May to October.

Has a large population of retired Europeans and Anglo-Indians. It is a very pretty station, and only 14 miles from Mussoorie. Soil rocky. Season—October to March.

At the Ladak end of the Zoji la Pass. The only accommodation is a Dak Bungalow. Season—June to September.

and those in plain figures, from the 8 hours' record only.
the mean of 8 hours' readings only.

NOTES ON HILL STATIONS

HILL STATIONS AND HEALTH RESORTS	ALTITUDE FEET	RAINFALL INCHES	MEAN TEMPERATURE DEGREES	PREVAILING WINDS	HUMIDITY
Gulmarg ..	8,500	..	..	..	..
Hazaribagh ..	2,000	..	..	..	..
Jubbulpore ..	1,327	55.01	76.5	{ N66°W* S33°W }	60† 67 }
Kasauli .	6,835	60.40	..	..	..
Kodakanal .	7,688	62.19	57.9	{ N9°W* N6°W }	69 }
Lansdowne ..	6,000	..	..	..	..
Leh ..	11,503	3.21	42.5	{ S54°W* S66°W }	51† 51 }
Murree .	7,507	59.00	57.7	{ S33°E* N84°E }	57† 56 }
Mount Abu ..	3,945	50	60	{ S39°W* S87°W }	53† 54 }
Mussoorie ..	6,705	94.30	57.1	N12°E	65
Maymyo ..	3,545	60.20	66.5	S43°W	84
Naini Tal ..	6,400	96.47	..	..	..

* In the case of winds, the values in bold figures are derived from 10 and 16 hours' observations.

† In the case of humidity, the figures in bold are true daily means, and those in plain figures are

AND HEALTH RESORTS

REMARKS

This is one of the prettiest and most enjoyable hill stations in India; 26 miles by motor from Srinagar and 2 miles up the hill by pony or dandy bring the visitor on to a large marg with two 18-hole golf courses, a first-class polo and gymkhana ground, and several tennis courts. Accommodation either in the large hotel (Nedou's) or in numerous electrically-lighted wooden huts is good. The Season is from June to the middle of September. Some people find the high altitude trying.

A sanatorium in Chota Nagpur The town is surrounded by hills and there are some fine lakes in the vicinity. The roads both in and outside the town are in good condition and suitable for motor-cars

Cases sent here from the eastern districts of the U P have benefited considerably. Kankar soil.

The Pasteur Institute of India Good natural drainage. Season—April to October.

On a plateau of the Pulney hills, a spur of the Ghats, in the Madura district of Madras. Much resorted to by Europeans throughout the year. Climate is cool and bracing. Noted for its remarkably dry gravelly soil.

Is a military cantonment situated in the district of Garhwal about half-way between Mussoorie and Naini Tal.

Leh and the whole of Ladak are an excellent climate for early cases of pulmonary tubercle. Season—end of May to October.

The houses crown the summit and sides of an irregular ridge. An admirable climate, very suitable for children.

One hour by motor from the railway Sanatorium for Rajputana and a celebrated place of pilgrimage. 17 miles from Abu Road on the B.B. & C.I. Railway.

Easy of access being only 14 miles from the railway by motor road. There are many excellent hotels and nursing homes. Massage and electric treatment are obtainable.

A plateau in the Mandalay District of Burma. A delightful place, the Simla of Burma.

About 21 miles by motor, or 13 miles by motor and 3 miles by dandy or pony. The station is cup-shaped, the houses being built on the sides from the edge of the lake, and unless accommodation can be obtained near the top it cannot be said to be healthy. The rainfall is heavy, and the southern side of the station is enveloped in heavy mist during the rains. The Ramsay Hospital for Europeans is one of the best in India, and, in addition to accommodation for about thirty patients of all classes, has a large maternity block. Season—April to October.

and those in plain figures, from the 8 hours' record only.
the mean of 8 hours' readings only.

NOTES ON HILL STATIONS

HILL STATIONS AND HEALTH RESORTS	ALTITUDE FEET	RAINFALL INCHES	MEAN TEMPERATURE DEGREES	PREVAILING WINDS	HUMIDITY
Nuwara Eliya (Ceylon)	6,240	93·9	59	..	83
Ootacamund ..	7,327	56·46	57·3	{ N72°E* S18°E* }	68
Puri (Orissa) ..	24	54·00	80·4	N77°W	83
Pachmarhu ..	3,528	75·75	70·4	{ N63°W* S84°W }	{ 60† 60 }
Panchgari ..	..	..	..	..	.
Quetta ..	5,502	10·02	58·9	{ N75°W* S15°W }	{ 51† 58 }
Ranikhet ..	6,069	52·15	60·3	{ S54°W* S72°W }	{ 65† 67 }
Rancho ..	2,128	56·20	74·9	S78°W	66
Shillong ..	4,920	86·05	61·7	S9°W	74
Simla ..	7,232	63·07	55·3	{ N1°E* N44°E }	{ 61† 57 }
Sonamarg ..	8,764	73·55	..	..	..

* In the case of winds, the values in bold figures are derived from 10 and 16 hours' observations.

† In the case of humidity, the figures in bold are true daily means, and those in plain figures are

AND HEALTH RESORTS

REMARKS

A good health resort for those on short leave from India.

Chief sanatorium of the Madras Presidency. Stands on a plateau in the Nilgiri Hills protected on the north-east and south. The gardens are *luxuriant*, and there are *extensive carriage drives*. 32 miles from Metapollum on the Madras Railway.

A popular health resort with good sea-bathing. It is easily reached from Calcutta by the Madras Mail, being only a night's journey. There are several hotels, the principal being Seaside Hotel, the Sanatorium Beach Hotel, Ocean Villas and Ashworth Villas Hotels. Accommodation for patients should be secured beforehand, as the number of visitors, especially during the holidays, is very large. There is a good sea breeze all the year round, but the humidity is high.

A table-land in the Hoshangabad district and is the Sanatorium of the Central Provinces.

29 miles from Wathar Station on the S.M. Railway, journey by motor car from Wathar. Owing to the purty and exhilarating effect of the climate, it is a favourite resort in summer, especially for the Bombay people.

A good all-the-year-round station. Very dry, cold in winter.

52 miles from Kathgodam by motor, this station has the advantage of being more or less on the flat, so that horse conveyances and motors can be used. There is a good golf course and extensive pine woods. Season—April to October.

Much used as a health resort by Europeans in the cold weather months. The new asylum for European patients is 7 miles from the station.

On a plateau in the Khasi Hills, 67 miles by road from Gauhati.

The Walker Hospital for Europeans and the Ripon for Indian patients. There are several very good hotels, and electric treatment is obtainable. Mashobra and Wild-flower Hall, about 6 miles from Simla, have excellent hotel accommodation and good pine forests. The latter, which is 1,000 feet higher than Simla, is to be strongly recommended for invalids. Season—April or May to October.

Is four marches from Srinagar up the magnificent Sind Valley, but not so bracing or beautiful as Batlial, 9 miles further on at the foot of the Zoji la Pass. Patients must take tents as the bungalow is small. Season—June to September.

NOTES ON HILL STATIONS

HILL STATIONS AND HEALTH RESORTS	ALTITUDE FEET	RAINFALL INCHES	MEAN TEMPERATURE DEGREES	PREVAILING WINDS	HUMIDITY
Srinagar ..	5,204	26.47	55.1	{ N18°W* S42°E }	{ 80† 86 }
Wellington ..	6,200	50.11	62.0	{ S18°E* S45°W }	{ 72† 68 }

* In the case of winds, the values in bold figures are derived from 10 and 16 hours' observations.

† In the case of humidity, the figures in bold are true daily means, and those in plain figures are

AND HEALTH RESORTS

REMARKS

196 miles from Rawalpindi by motor, is very warm in the months of June, July and August, and during the winter months is very sunless. The accommodation is principally in house-boats moored along the banks of the Jhelum and its backwaters. These boats for the most part are well furnished and lighted with electric light. There is a cottage hospital for the accommodation of Europeans, and a large Mission Hospital for the treatment of Indians. Season—Divided into two parts, first at Srinagar, April to June, and then September to November, the remaining months, June to September, being spent at Gulmarg, 9,000 feet above sea-level, an ideal summer resort.

Sanatorium and cantonment 9 miles from Ootacamund in the Nilgiri district, Madras

*and those in plain figures, from the 3 hours' record only
the mean of 3 hours' readings only*

HOOKWORM—See Worms.

HORMONES (See also Addison's Disease, Diabetes Mellitus, Goitre, Gynaecology, Impotence, Testicle, Undescended.)

PITUITARY.—So far as is known at present, although other functions may be discovered:

The Anterior Lobe controls or influences:

Growth (Acidophilic Cells)

Development of Subcutaneous Tissues (Basophilic Cells)

Development and functioning of sex organs and their production of hormones (Prolan A and B and male gonadotrope)

Lactation (Prolactin)

The Thyroid Gland (Thyrogen)

The Adrenals

The Parathyroids

The Thymus, and to some extent the metabolism of fats and carbohydrates.

The Posterior Lobe:

Inhibits excessive secretion of urine (probably by promoting re-absorption in the tubules)

Raises the blood-pressure and increases peristalsis (Pitressin)

Makes the parturient uterus contract (Pitocin)

which is a remarkable achievement for what *Gray's Anatomy* describes as "a small reddish-grey vascular mass weighing from five to ten grains."

Over-action of the basophilic cells produces Cushing's syndrome and is commoner in females; the leading symptoms are hairiness of the face and chest, increase of the fat of the face and the abdomen, a curious purple blotching of the skin, raised blood-pressure, weakness, amenorrhoea and severe headaches.

Under-action of the pituitary as a whole leads to non-development or atrophy of the sex organs and under-development of the body.

The severe obesity which occurs in some women after their first child is believed to be due to the same cause.

The weakness and lack of virility from which some middle-aged men suffer is also believed to be due to lack of pituitary activity, particularly in producing its thyroid, adrenal and testicle-stimulating hormones.

PREPARATIONS.—The following are some of the pituitary or pituitary-like preparations and their uses:

Anterior Lobe.—Antuitrin "Growth" (Parke Davis—a similar preparation of the growth hormone is made by Armours). The average dose is 60-100 units a week. In the writer's hands this hormone has proved disappointing; it is also very expensive.

Gonadotropic pituitary-like hormones

These are made commercially from the urine of pregnant women or mares, or from the serum of pregnant mares; the hormone,

although similar to that made by the pituitary, is probably manufactured by the placental cells. The serum preparation appears not to be excreted, but to be metabolized, so doses are given at longer intervals.

The following are made from pregnancy urine: Antuitrin S (P.D. & Co.), Gonan (B.D.H.), Physostab (Boots), Pregnyl (Organon); the usual dose is about 500 units. The main action is on the corpus luteum, so the net effect resembles that of progesterone, but it also has a stimulating effect on the male gonads.

Serogan (B.D.H.), Autostab (Boots) and Gestyl (Organon) are made from the serum of pregnant mares and their effect is chiefly on the ovarian follicles and on the sperm-forming cells in the male, so the results resemble those of oestrogen.

PINEAL BODY.—Although held in high esteem by students of the occult this gland has so far not been found to have any specific function beyond sometimes forming the origin of a tumour. Extracts are said to retard growth and the effects on the genital organs are disputed, some observers saying that they cause atrophy, others hypertrophy.

THYROID GLAND (*see also* Goitre).—Over-secretion causes all the symptoms of fear; staring eyes, profuse sweating, trembling hands, tachycardia and often diarrhoea.

Under-secretion causes myxoedema of varying degrees, the mildest being perhaps a dry skin and a sensitivity to cold.

Thyroid preparations are among the few gland extracts that are effective by the mouth. The official preparation is Thyroideum Siccum, of which the dose is $\frac{1}{4}$ –5 grains, the usual dose being $\frac{1}{2}$ –2 grains three times a day.

THYMUS GLAND.—Extracts have been alleged to accelerate growth in rats, but the evidence is inconclusive. The gland atrophies at about puberty, but is enlarged in status lymphaticus and persistent in some forms of infantilism, in Graves's disease, and sometimes in Addison's disease. It also persists in myasthenia gravis and its removal has been followed by cure.

ADRENAL GLANDS.—These consist of two distinct parts, the cortex and the medulla.

The Cortex.—This produces the androgenic hormone androsterone, which has effects similar to those of testosterone; corticosterone and desoxycorticosterone maintain the blood-pressure and are essential to life. All three hormones can be prepared synthetically; for methods of administration, *see* Addison's disease and Impotence.

Adenoma or carcinoma of the adrenal gland can produce very marked virilism, and should be suspected when a female develops strong male characteristics, including hypertrophy of the clitoris to the size of a penis. In his young days the writer once amputated such a clitoris; he should have examined the adrenals and removed a tumour from one of them.

Destruction of the adrenals, usually by tubercle, produces the low blood-pressure, anaemia and pigmentation of Addison's disease.

The Medulla.—This produces adrenaline which, as is well known, causes vasoconstriction, rise of blood-pressure and an increase in the output of sugar from the liver glycogen. Normally the output of adrenaline is intermittent and slight, but when a man is facing a crisis it rises considerably in order to brace him up for physical struggle, during the course of which uncivilized man uses it up; it is thought that the same thing happens before the sedentary battles of the business executive and partly accounts for the frequency of high blood-pressure in these individuals.

PANCREAS.—See Diabetes Mellitus.

OVARIES.—These produce two main hormones, oestradiol (oestrogen, Oestroform, Ovocyclin, Progynon, etc.) and progesterone (progestin, Lutocyclin, Proluton, etc.).

Oestradiol is formed during the first half of the menstrual cycle and causes restoration of the endometrium shed at the preceding period, the hormone ceases to be formed when the Graafian follicle ruptures between the 13th and 17th day.

The average dose of oestradiol is between five and fifty thousand units by intramuscular injection once or twice a week; the following are the main conditions for which it is used:

Vomiting of Pregnancy

Induction of Labour

To stop Lactation

For the Premature infant

Vulvo-vaginitis of children

Amenorrhoea, Dysmenorrhoea

Female Infantilism and Under-development

Menopausal and post-menopausal disorders such as flushes, insomnia, nervous symptoms, involutional mental states, kraurosis vulvae, leucoplakia vaginae, pruritis and high blood-pressure.

Non-gynaecological conditions are ozaena and atrophic rhinitis in which the hormone is given intramuscularly and also sprayed on the nasal mucous membrane. Some of the symptoms of Cushing's syndrome, especially the severe headaches, may be relieved by large doses of oestradiol; it has also been used for chronic cystic mastitis, but androgens are generally more effective.

In males, large doses have proved effective in relieving the symptoms and improving the general health in carcinoma of the prostate, which is interesting, because very large doses given to animals have been found to be carcinogenetic.

Progesterone is the hormone of the corpus luteum and begins to be formed after ovulation, when the formation of oestradiol ceases. In the absence of pregnancy it "takes over" the endometrium halfway through the menstrual cycle and prepares it for reception of the ovum. During pregnancy it is formed in large quantities and

some of its functions are: to prevent premature contractions of the uterus; to assist in the nourishment of the embryo and the formation of the placenta; and to promote the development of the breasts.

Therapeutic Uses.—For

Threatened Abortion

Habitual Abortion

Uterine Hypoplasia (given with oestradiol)

Dysmenorrhoea

Menorrhagia

"After-Pains".

It is also used to diminish sexual desire in those unhappy females whose appetite for the male cannot be legitimately satisfied.

Natural oestradiol is ineffective when given by the mouth and is often replaced by one of the synthetic sterol compounds such as stilboestrol or dienioestrol, which are given as tablets by the mouth; the former is apt to cause nausea in some people, but not the latter, which is also about three times as strong. An average dose of stilboestrol is $\frac{1}{4}$ to 1 milligram two or three times a day and of dienioestrol $\frac{1}{2}$ of a milligram.

Synthetic substitutes for progesterone are both cheaper and more effective than the natural hormone and are made from soya beans; oral tablets are also available.

THE TESTICLE.—The naturally occurring hormone is testosterone, the effect of which is to promote and maintain normal sexual development in the male. It is excreted in the urine as degeneration products such as androsterone, which was the first male hormone to be discovered.

Testosterone propionate is prepared synthetically and is given in doses of 5–25 milligrams intramuscularly, daily or less often according to circumstances.

Methyl testosterone is also prepared synthetically and is effective by the mouth, 50–100 milligrams daily having been found to maintain potency in a eunuch.

Clinical Uses.—Maldevelopment, impotence and absence of male libido have been treated with this hormone, besides many other conditions such as enlarged prostate, "male climacteric" and middle-aged impairment of memory and virility.

In females it has been used successfully in chronic cystic mastitis and menorrhagia; it also, like oestradiol, dries up the milk supply.

Many middle-aged and elderly men who feel that their work and responsibilities are getting too much for them benefit from a course of methyl testosterone.

HYDROCELE

Acute hydrocele occurs in connexion with injury or orchitis and usually subsides with the cause; otherwise it may be tapped.

Chronic hydrocele is commonest in middle-aged patients and unless associated with a hernia is probably due to some mild infection of the testis; occasionally, it is syphilitic or accompanies a tumour.

TAPPING A HYDROCELE.—

- (1) Make sure it is a hydrocele; stretch the skin well by squeezing the hydrocele in the left hand and enter the trocar and cannula from in front, into a translucent area through an avascular patch of skin which has been carefully sterilized.
- (2) Draw off all the fluid.

For Injection Treatment now inject 3 c.c. of quinine (0.4 gramme)-urethane (0.2 gramme) solution, sodium morrhuate or Ethamolin solution through the same cannula, withdraw the cannula and seal the puncture. The fluid generally re-accumulates but if it is completely withdrawn again at the end of 10 days, the two layers of the tunica vaginalis may adhere and a cure results; the treatment is worth trying but is not always successful. Quinine-urethane causes less pain than the other remedies.

OPERATIVE TREATMENT.—

A thin sac may be opened and turned inside out through a small incision in the groin, the edges of the hole in the sac being attached by a few stitches to the back of the epididymis. Choose an avascular area of the sac and tie any bleeding point, no matter how small.

A thick sac should be excised to within a short distance of its attachment to the testicle; the incision may be either scrotal or inguinal, the writer preferring the latter. Haemostasis must be absolute, and every case must be drained through a scrotal stab wound for three days, otherwise there will be a haematocele and the patient will be worse off than before.

If the testis is diseased it should be removed.

After-treatment.—The scrotum must be raised either by cotton-wool and bandaging or by a board across the thighs with the scrotum resting on it. If a patient complains (or boasts) that he has three testicles he has an encysted hydrocele of the cord. These swellings seldom become larger than the testicle, but if troublesome they may be tapped and injected, or excised.

HYDROTHERAPY

Water as a therapeutic agent may be employed externally, either as ice or in liquid or vapour form; it is applied at varying degrees of temperature, either alone or impregnated with other substances. While many complicated methods of application can only be carried out when a complete hydrotherapeutic apparatus is available for heating and cooling the water, the essential principles of the cold bath and wet pack, indispensable in the treatment of many cases of enteric fever and heat-stroke, can be carried out in any Indian house, with the aid of a charpoy, a *mussack* of water and a sheet.

The following are the methods of application:

BATHS

An ordinary bath is 30 gallons.

(a) TEMPERATURE OF BATHS.—

	F.	C.
Cold Bath	40° to 65°	4·4° to 18·3°
Cool Bath	65° to 75°	18·3° to 23·8°
Tepid Bath	85° to 95°	29·4° to 35°
Warm Bath	95° to 100°	35° to 37·7°
Hot Bath	100° to 110°	37·7° to 43·3°
Very Hot Bath	110° to 120°	43·3° to 48·8°

(b) VAPOUR BATHS.—

	F.	C.
Warm Vapour Baths ..	100° to 115°	37·7° to 46·1°
Hot Vapour Baths ..	115° to 140°	46·1° to 60°

A vapour bath may be improvised by placing in the bed a few strong bottles filled with nearly boiling water tightly corked down and wrapped in pieces of flannel wrung out of hot water. The patient should be well covered, and the bottles should be placed round him in the bed.

(c) CONTINUOUS BATHS.—

WARM BATH.—The patient having his head covered with a cold cloth, lies fully immersed in water at 95° to 100° F.; it is useful in severe skin eruptions like pemphigus, and in nerve lesions, such as paraplegia, locomotor ataxia, and hemiplegic contractures, sciatica, muscular and articular rheumatism. The continuous warm bath is also of great value in the daily treatment of mania, in that it raises the previously pathologically low blood-pressure, and leads to great amelioration of symptoms.

(d) TURKISH BATH.—The patient, after drinking water freely, enters a room with dry air at 110° to 130° F.; when perspiring freely, he enters another room at 150° to 200° F. for a few minutes, during which time he is rubbed vigorously with bare hands. A cold douche at 60° F. is then given, followed by a cold plunge in water at 60° F. He then lies down until the skin is dry and the pulse normal. Finally, he is rubbed with alcohol and allowed to rest.

(e) MEDICATED BATHS.—

- (1) **ALKALINE BATH.**—Sodium Carbonate, $\frac{1}{2}$ oz. to every gallon of water.
- (2) **ACID BORIC BATH.**—Boric Acid, 2 oz. to every gallon of hot water.
- (3) **SULPHUR BATH.**—Potassium Sulphide, $\frac{1}{2}$ oz. to every gallon of water.
- (4) **SALT BATH.**—Sodium Chloride or Sea Salt, 4 to 8 oz. to every gallon of water.
- (5) **MUSTARD BATH.**—Mustard, $\frac{1}{2}$ to 1 oz. to every gallon of water as hot as can be borne. Rub the mustard to a smooth paste with cold water before adding it to the hot water.
- (6) **ACID BATH.**—Nitro-Hydrochloric Acid Dilute, 14½ oz. to 30 gallons of water.
- (7) **BRAN BATH.**—Wheaten Bran, 64 oz. to 30 gallons of water.

PACKS

(a) **COLD WET PACK.**—The patient, quite naked, with the arms extended, lies on a sheet wrung out of very cold water. The sheet on one side is wrapped over the body and limbs, the hands are brought to the sides, and the other half of the sheet covers in both arms and legs. A hot bottle is applied to the feet, which are not covered by the sheet, and a cold compress to the head. The patient is now well covered with blankets, closely adjusted round the neck, so as to exclude all air.

(b) **HOT WET PACK.**—This is done in the same way as above with hot instead of cold water. It is useful in infantile convulsions, and bronchitis in children, and very valuable in uraemia, chronic parenchymatous nephritis with anasarca, and eclampsia.

(c) **THE DRIP SHEET.**—The patient stands in a tub with water at 100° wrapped in a sheet soaked in water at 75°. A basin of water at 65° is poured over the head and shoulders at short intervals, and friction and slapping are kept up by the nurse for 5 or 10 minutes. The sheet is then removed, the patient dried with warm towels; he then dresses and takes light exercise. Useful in anaemias, neurasthenies, and all cases requiring stimulation, when the patient is not too feeble to react.

SPONGING

Take the patient's exact temperature, remove all clothing, and place one blanket under and another over the patient, with a hot bottle at his feet.

First sponge the face and neck with tepid water 80° to 90° F. Always sponge downwards, exposing only the part being sponged. On reaching the feet, begin again at the head. After the whole body has been sufficiently sponged, dry lightly, cover with a light warm blanket and leave undisturbed for an hour. Take the patient's temperature immediately after sponging, and again after the hour's rest. Sponging usually causes a reduction in temperature of one to four degrees F. In stronger patients, the water may be used at 60° F., or the arms, back, and chest may be allowed to dry by evaporation. Cooling by rapid evaporation is favoured by the addition of vinegar, Eau-de-Cologne or ammonia to the water.

Sponging is beneficial in febrile conditions, especially typhoid fever. A cold abdominal compress is sometimes applied to enhance the effect of the sponging. It is important to bear in mind the danger of collapse during this procedure.

COMPRESSES

(a) **COLD COMPRESS.**—Linen is partly wrung out of water at 50° to 60° F., laid evenly over the affected part, and covered with a flannel binder several layers thick, to prevent radiation. The compress is renewed every hour. This is very useful at the onset of pneumonia, and can be used to relieve the pain of appendicitis and peritonitis due to perforation while preparations are being made for operation.

(b) **ICE COMPRESS.**—This is best applied in the form of an icebag.

(c) **HOT COMPRESS (FOMENTATIONS).**—Several thicknesses of flannel or lint should be boiled for five minutes, wrung out as dry as possible, and then applied beneath oiled-silk and wool. If applied wet the skin becomes sodden and is frequently scalded. Hot compresses hasten suppuration, relieve the pain of arthritis, sprains, lumbago and neuralgia, and are useful in the treatment of bruises, cramps and hepatic and renal colic.

DOUCHES

There are many kinds, classified according to the part of the body treated, as head, spinal, or perineal douches; according to the temperature of the water, as hot, tepid or cold; or according to the form of the stream of water, as needle, spray, rain, and fan, under greater or less pressure.

Douches are useful in treating limited parts of the body.

AFFUSIONS

The patient, stripped naked, has basins of very cold water dashed at him from a height or distance of several feet. This is strongly stimulating, especially in cases of hysterical immobility.

HYPERPARATHYROIDISM. OSTEITIS FIBROSA DIFFUSA

When the parathyroid glands are removed tetany is produced, with a low serum-calcium (6–7 mg. %). The condition of parathyroid tetany can be remedied by subcutaneous injections of the active hormone of the parathyroid glands (parathormone Collip) and if sufficient be given this causes the serum-calcium to return to normal (10.0–11.0 mg. %). If an overdose is administered symptoms such as vomiting and headache arise, with a serum-calcium of 15 mg. %. Further overdosage leads to great drowsiness and polycythaemia, and death when values of about 20 mg. % of serum-calcium are obtained. A clinical state of spontaneous hyperparathyroidism has now been recognized, in which the chief symptoms are vomiting, headache, lethargy and pains in the limbs. This is due in most cases to a cystic adenoma of one of the parathyroid glands, which may occasionally be felt as a tumour in the neck, or else to hyperplasia of all the four glands. The diagnosis is made by finding a high serum-calcium value (13–16 mg. %) and a low phosphate value: the high blood-calcium is associated with excessive excretion of calcium and of phosphorus in the urine (sometimes leading to calcium phosphate calculi), and the output exceeds the intake ("negative balance"). To compensate for this the bones are depleted of their stores of calcium phosphate (general osteoporosis) and large cysts may occur in the place of the original bone (osteitis fibrosa cystica). The decalcification may lead to general collapse of the long bones, especially of the legs and of the vertebral column, and so multiple bony deformities with diminution of stature may arise. This condition is rectified if the over-acting parathyroid gland

is removed, when the blood-calcium and blood-phosphorus values return to normal, and if sufficient calcium and vitamin D be given recalcification of the bones will occur.

HYPERPIESIS—See Arteriosclerosis.

HYPOPION—See Eye.

HYSTERIA AND FUNCTIONAL DISEASE

When symptoms fail to agree with the known facts of anatomy and physiology think of hysteria.

A hard-worked officer in the Political Department suddenly lost his sight while studying a file in Simla. Examination showed contraction of both visual fields, but no perceptible abnormality in either eye, and the Wassermann test was negative. The officer had not had leave for some years. The visual fields contracted still further (careful perimetry would probably have shown that they were contracting in the typical spiral manner), so the officer was invalided to the United Kingdom, where he recovered his sight completely, retired from the service and subsequently had a career of some distinction.

Another officer of the writer's acquaintance was blessed with chronic ill-health, a bullying temperament and an attractive, but childless, wife. After nursing her husband devotedly for many months the wife suddenly developed paralysis of the whole of the left leg. There was no wasting, all reflexes in the affected limb were brisk but normal, there was no anaesthesia and a careful examination of the whole nervous system—including a Wassermann reaction—revealed no abnormality whatever. With the transfer of their friends' sympathy from her husband to herself her condition rapidly deteriorated and she developed "palpitation of the heart"; soon the husband's health improved and when he was finally pronounced fit for service his wife recovered.

Twelve hours after exposing himself to a possibility of venereal infection a sailor developed complete paralysis of "everything below the waist" except his bladder and rectum, which functioned normally. Inquiry revealed that he had been told that syphilis was the cause of general paralysis: when he was convinced that he had not got syphilis and that in any case general paralysis did not come on until many years after infection he recovered, but it took time.

These three cases have been quoted in detail to show some of the common causes of hysteria, and if the cause can be found cure often follows quickly, if the patient really believes it.

The basis of hysteria is a desire for escape "without loss of face"; a desire for attention; unsatisfied sexual or maternal longings; or fear of the unknown. The above cases, all of which came under the writer's personal notice, illustrate some of these points.

A further point of interest is that when a sudden and dramatic cure is obtained by unorthodox or seemingly miraculous means the case is always one of hysteria. A young woman in Belfast, suffering from "complete paralysis", was seen by a brusque but very shrewd

physician who, after making a careful examination, told her to get out of bed. She replied that she was paralysed, and could not possibly get out of bed. "All right, I shall get into bed with you", replied the physician, whereat the horrified young woman leapt out of bed and ran from the room.

In a different class, but with the same underlying motive, namely, a morbid craving for sympathy and attention, are hysterical fits, which may closely resemble epilepsy, but there are certain points which to the initiated unerringly indicate hysteria; the patient is generally young and female, always performs before an audience, and never hurts herself. Further, the experienced physician at once gets a feeling that the patient is acting, or over-acting, as though she were the heroine of a sentimental melodrama—which, of course, is what she is in her own eyes.

Hysterical anaesthesia is almost too well known to need description; classically, it does not follow the laws of anatomy, often varies from day to day, may be of the "glove and stocking" type, and frequently affects only one limb or even the whole of one side of the body.

The disease most commonly diagnosed as hysteria is early disseminated sclerosis, so if the patient complains of tremors, etc., this disease must be carefully excluded. Subacute combined degeneration of the cord also produces a glove and stocking anaesthesia, and cerebral tumour may produce some of the signs of hysteria; otherwise there is not much in the way of differential diagnosis of nervous complaints.

A complete list of hysterical manifestations is impossible, but amnesia, sleep-walking, shell-shock, functional tachycardia and many cases of "effort syndrome" are hysterical in origin and all have the fundamental basis described above, and all have the same characteristic—they cannot be explained on ordinary grounds. Further, many of them disappear when the patient's subconscious mind achieves its purpose, but other "syndromes" may occur later.

An interesting physical sign about many hysterics is analgesia of the palate.

In peace, the dominant fear is of unemployment, poverty and loss of position; in war it is of death, but amongst soldiers and the more self-respecting civilians, almost equally strong is the fear of appearing to be a coward in front of one's fellows.

We find, therefore, that in war the human body becomes the vehicle of all sorts of ingenious subterfuges having their origin in the subconscious, which is not afraid to say "I am afraid" and to add, "If I cannot get out of this by fair means I'll do it by foul". Thus, the weary rifleman develops paralysis of the trigger finger, the cipher clerk's sight goes wrong, the submarine officer develops claustrophobia, and so on; from which it will be seen that the subconscious can display an uncanny ingenuity in providing just that disability which will gracefully enable the patient to avoid the particular duty he fears.

These disabilities may be carried into civil life, subconsciously if

they have increased the patient's self-esteem, consciously if they have increased his pension, and the difference between the one and the other may be very hard to determine.

In examining "functional" and hysterical patients careful inquiries into the history and surroundings should always be made, as this may be the clue to successful treatment; Kipling says, "An odious woman married may bear a babe and mend," and this is the answer for many hysterical young women. Nothing gives a woman such a feeling of success as being happily married, and happiness is incompatible with hysteria.

A thorough physical examination must also be made, for three reasons; first, the patient has probably been examined before, knows all the "tricks of the trade" and will have no confidence in the doctor if she thinks he has left anything out; secondly, the examining physician must himself be certain that the case is one of hysteria, otherwise he will lack that self-confidence which is essential to success; thirdly, he may discover an organic basis for the symptoms.

It must not be thought that hysteria is the same thing as malingerer—it is not. Hysteria is the triumph of the subconscious over the conscious, malingerer, of the conscious over the conscience.

While psychotherapy is the essential part of the treatment of hysteria, there are certain adjuvants. As already pointed out, one of the important aetiological factors is a morbid desire for sympathy and notice, so the patient should be removed to surroundings where even the most bizarre antics fail to produce any obvious impression on the attendants. Relatives should therefore be excluded.

It is a mistake, however, to think that all these patients are excitable and emotional; some of them discuss their symptoms with, apparently, the calm detachment of the pathologist in the post-mortem room, but underlying this superficial attitude there is always a camouflaged desire to show off, often betrayed by a morbid interest in the latest details of their symptoms, an interest which the physician finds it difficult to share. These cases are not easy to cure, but much can be done if the patient has confidence in the doctor and if the latter can discover and abolish the reasons for the manifestations, which the patient may not be willing to acknowledge even to herself. In other words, these patients do not want to be cured, they want to be interesting.

With two exceptions, drugs are not on the whole to be recommended; the bromides and the slowly-acting barbiturates such as Gardenal will calm an excitable patient and make her more suggestible and amenable to reason. Suggestion therapy, under light intravenous barbiturate amnesia, has also been used with success and a few details are given below; it is, however, a method for the specialist. The same remark applies to hypnosis, which has many dramatic cures to its credit, but a certain proportion of these patients relapse, possibly because the cure is not of their own doing but is forced upon them, so they still feel subconsciously unsatisfied; another

reason is, of course, that most of these patients are neurotic, highly-strung people, often the descendants of a neurotic stock.

Finally, with the rapid growth of scientific medicine we are apt to forget that, even when organic disease is present, great improvement in the patient's outlook and capabilities can be brought about by judicious and encouraging psychotherapy. In this respect we have something to learn from the "quacks" who, although they may not know what is the matter with their patients, display no doubt whatever about their ability to cure them.

THE BARBITURATE TREATMENT OF HYSTERIA AND THE NEUROSES.—In recent cases of hysteria, especially cases of shell-shock when first seen, preferably *just after* the causative accident, a great deal of time and misery may be saved by giving an intravenous barbiturate. Sodium Amytal has been much used in America, but Cyclonal Sodium and Pentothal are both suitable. The drug is given very slowly, much more slowly and in smaller dosage than when given for anaesthesia, the aim being to make the patient relaxed and to abolish his inhibitions, but not to make him confused or unconscious. To increase the effect and therefore reduce the dose of the barbiturate, Sargant recommends that the patient should first "hyperventilate", which means that he breathes in *and out* (to eliminate CO_2) as deeply as possible for as long as possible, usually three or four minutes. During the semi-amnesic stage of barbiturate intoxication the patient is not only communicative, he is eminently suggestible. Had this treatment been discovered and carried out in the case of the sailor above mentioned he could probably have been cured in a few minutes. As the patient emerges from the amnesia he generally wants to go to sleep, but this must not be allowed. He should be kept fully aware of the improvement until he is fully conscious; if, however, the treatment has been a failure he should be given more barbiturate and put to sleep, in the hope that he will forget about it.

Continuous-sleep treatment, though a method for the specialist, has proved most successful in cases of "nervous breakdown", of which we see quite a number in India. The principle is that the brain is emptied and rested, so the patient is kept under Amytal or some such drug for two or three weeks, being allowed to "come to" for a few hours each day in order to take his food. Incidentally he is very suggestible during these few hours, so the psychiatrist should make good use of them.

ICHTHYOSIS

In its milder forms it is a constitutional dryness and roughness of the skin. The patient should take a daily bath and rub in that form of grease which has been found by experiment to suit his skin best; to this may be added in the proportion of 2-5% an antiseptic such as resorcin, Ichthyol, sulphur, or salicylic acid.

Internally, thyroid gland does good in some cases, also cod-liver oil, peas, and beans.

IMMUNOTHERAPY—See Specific Therapy.

IMPETIGO CONTAGIOSA

TREATMENT.—Remove scabs by means of boric-starch poultices.

R Boric Acid	..	..	..	..	..	3j
Starch	..	..	..	..	..	3ss

Make into a smooth paste with cold water, add a pint of boiling water, stir well and allow to cool. Take two layers of gauze or one of malmal, spread the paste on it thickly and apply to the skin, gauze side to the skin.

When the crusts are removed, apply one of the following:

(a) R Sulphathiazole ointment, 10% in Vaseline, or Cibazol ointment.

(b) The same, with 10% penicillin added.

(c) R Lanolin (or Lanette Wax)	..	..	3jss
Liquid Paraffin	..	..	3j
Penicillin solution containing 10,000 units	..	..	1j
Aq. Destil ad	..	..	3iv

(d) R Cupri Sulph.	..	..	..	gr. 3
Zinc Sulph.	..	..	..	gr. 2
Sulphur. Praecip	..	..	..	gr. 5
Pulv. Sulphathiazole (= 12 tablets)	..	..	..	jss
Zinc Oxide	..	..	..	ss
Pulv. Amyla	..	..	..	ss
Paraff. Moll.	..	..	..	3j

IMPOTENCE, SEXUAL

The cases due to deformity or disease are outside our present scope although it is worth remembering to test the urine, because impotence sometimes occurs in diabetes. A careful examination must be made for two reasons, to secure the patient's confidence and possibly to find a hitherto undiscovered organic cause. A very careful history must be taken, because the cause often lies in the history, a common statement being that the patient masturbated in his youth and fears that he has exhausted his virility; he should then be told that most children and healthy adolescents masturbate, but grow up into normal husbands and wives, so no importance should be attached to it. It is more difficult to allay the fears arising from the similar history that the patient "overdid it" when first married, but he can be told that as people get on in years their sexual appetite naturally declines, which is a blessing for their peace of mind.

Nervousness, fear and worry are the commonest causes of impotence and a careful inquiry must be made with a view not only to finding out the cause of the mental condition but also to finding a remedy. In an obscure case a confidential talk with the wife may provide the answer, because most people are more ready to talk about other people's conduct than about their own.

A troublesome case is that of the rich old man who cannot

satisfy his young wife; the only real answer is that he should not have a young wife, but as he has, something presumably has to be done about it.

Combined with psychotherapy, which if well done will succeed in restoring the patient's faith in himself and hence in his sexual powers, a great deal can be done by hormones and tonics, and, as already related under dyspareunia, the generous but not excessive administration of a stimulating alcoholic beverage such as champagne may play a useful part in overcoming inhibitions.

Testosterone propionate (Neo-Hombreol, Perandren, etc.), 25 milligrams intramuscularly every day for a week, aided by a pill such as the following, may work wonders.

R. Extract. Nucis Vom. Sicc.	.	.	gr. $\frac{1}{2}$
Yohimbinae Hydrochlor.	..	..	gr. $\frac{1}{2}$

Cantharidine has a great reputation as an aphrodisiac, the *French Pharmacopoeia* giving the dose as 0.2 milligram (about $\frac{1}{500}$ grain), but it is a dangerous drug because it causes nephritis.

Damiana is much advertised in chemists' and rubber-goods shops of the baser sort and may be given in various ways. Pil. Damianae Co. B.P.C. contains Ext. Damianae gr. 2, Sevum (Suet) Phosphoratum B.P.C. gr. $\frac{1}{16}$ and Ext. Nuc. Vomicae Sicc. gr. $\frac{1}{16}$.

Mist Damianae Co. (B.P.C.).

R. Ext. Damianae Liq.	..	..	℥ 30
Ext. Nuc. Vom. Liq.	..	..	℥ 2
Calcii Hypophosphit.	}	.	aa gr. 5
Sodu Hypophosphit.			
Aq. Chlorof. ad	..	..	℥ j

A good mixture is the following :

B Yohimbinae Hydrochlor.	gr. $\frac{1}{2}$
Extr. Damianae Liq. (B.P.C.)	℥ j
Liquor. Strych Hydrochlor	℥ 5
Spirit. Vini Rect. }	} .. aa ℥ j
Tinct. Card. Co. }	
Spirit. Chlorof.	.. .. ℥ 15
Aq. ad	.. .. ℥ j

(The pink colour and stimulating taste of this mixture are helpful because they make the patient have faith in its efficacy, a matter of the greatest importance.)

Needless to say, the general health of these patients should be attended to; they should spend plenty of time out of doors, and should eat plenty of food including meat.

Finally, the woman can often make herself more desirable by means of cosmetics, scent, underclothes, music, gestures, conversation, and other "allure" better known to the sophisticated female than to a mere male author.

INCOMPATIBILITY—See Drugs.

INCONTINENCE OF URINE—See Enuresis in Children.

INCUBATION PERIODS OF INFECTIOUS DISEASES

A simple way of remembering approximate incubation periods is as follows:

(a) *Seven Diseases are about 10 to 15 days*, namely,

Whooping-Cough,

and those which go in pairs:

Measles—German Measles

Typhoid—Typhus

Smallpox—Chicken-pox

(b) Mumps is unique, about 21 days

(c) *All the rest* are about 1–5 days, namely,

Scarlet Fever

Diphtheria

Cerebrospinal Meningitis

Plague

Cholera

Influenza

Common Cold

Bacillary Dysentery (Amoebic Dysentery, 3–6 weeks)

INDIGESTION—See Dyspepsia.

INFANT FEEDING (See also *Obstetrics and Nursing*.)

BREAST FEEDING.—Breast milk is the natural food, is at body temperature, is free from all contamination, and suits nearly every child. It also has the advantage of being cheap and of saving all the trouble involved in artificial-food preparation, care of bottles, etc. Breast feeding is still too often abandoned with too little effort to make it a success.

Breast feeding is contra-indicated if the mother suffers from severe anaemia, tuberculosis, renal disease, cardiac disease, insanity, acute septic infection, puerperal fever, pneumonia, epilepsy or eclampsia.

CAUSES OF DEFICIENCY IN BREAST MILK.—These include:

- (1) Deficiency in the mother's diet, lack of exercise and fresh air, and nutritional disturbances, all of which are common in India.
- (2) Deficient development of the breasts, depressed, retracted or deformed nipples, or a baby that is feeble and cannot suck.
- (3) Taking strong aperients, such as sodium sulph., mag. sulph., cascara, aloes.
- (4) Excessive worry or fatigue on the part of the mother, and sometimes heredity or constitution.

TEST FEEDS.—These are often carried out as part of routine, but if the baby is restless and fretful, cries before and after meals, is constipated and does not gain weight it should be weighed before

and after each feed throughout one day, care being taken that a wet napkin is not changed until the weight is recorded.

THREE-HOURLY OR FOUR-HOURLY FEEDS.—Much discussion has taken place on this subject, but the general opinion is that a baby weighing more than six and a half pounds at birth does well on four-hourly feeds, but smaller babies do better on three-hourly feeds. It should not be necessary to stress the necessity for absolute regularity in feeding, but in India it is still far too customary to feed the baby whenever it cries, which is a great strain on its digestion, and not good for the mother's milk supply. If four-hourly feeding has been adopted, the hours are: 6 a.m., 10 a.m., 2 p.m., 6 p.m. and 10 p.m., with no feed during the night. If the baby wakes earlier than 6 a.m. there is no harm in feeding it then, so long as the other feeds during the day are punctual: 10 a.m., etc.

If three-hourly feeds are to be given, they are: 6 a.m., 9 a.m., 12 noon, 3 p.m., 6 p.m. and 9 p.m. It will probably be found that the three-hourly baby gives up the last feed sooner than the one that is fed four-hourly, though naturally every baby must be treated on its own weight, habits and needs.

A normal baby should not feed for more than seven minutes at each breast per feed, and the left breast should be given first at one feed and the right at the next. If a baby takes longer, cries and appears unsatisfied, it is a clear sign that it is not getting enough milk. Test feeds must then be given, and other systems tried.

WEIGHT.—The baby should gain up to 8 oz. per week for the first three or four months, and about 4 oz. per week (1 lb. per month) for the next few months. But by the time it reaches 15 lb. in weight some addition should be made to the breast milk, as the child requires 35 oz. per day (*see Weaning*).

WET NURSING.—In India this may be a life-saving measure, as not all mothers have the money or application to prepare artificial feeds cleanly and correctly.

A wet nurse should be between 18 and 30, clean and free from disease. As many syphilitic women have dead or diseased babies, it is generally advisable to have a Wassermann or Kahn test carried out before the woman begins nursing.

ARTIFICIAL FEEDING.—If this is necessary and the patient can afford artificial food the best thing is to put the child on some well-known proprietary food such as Ostermilk, Allenbury's No. 1, Cow and Gate, or Lactogen and follow the directions on the tin.

This is particularly advisable in India, where the milk supply is notoriously poor and contaminated.

A rough guide to the amount required per feed is one ounce to every two pounds of the child's weight, e.g., a 10 lb. baby requires 5 oz. at each feed.

When the child has been on a proprietary food for two or three months, good sterilized cow's milk, if obtainable, should be gradually substituted.

If cow's milk is to be given from the beginning and the baby is healthy, some authorities advise giving the milk undiluted but with one grain of citrate of soda to each ounce; that is the simplest method but not all babies can stand it. Most babies, however, thrive on undiluted cow's milk when they have reached six months.

HUMANIZED MILK.—For the first two weeks give equal parts of milk and water; the latter is gradually decreased until whole milk is being taken. To give the needed amount of sugar, add one teaspoonful of granulated sugar to each three ounces of the mixture. One to three grains of citrate of soda should be added to each bottle to make the curds fine. Theoretically, cream should be added in order to bring the strength up to that of human milk, but in practice it is found that added cow's cream is indigestible and that children do better without it.

A teaspoonful of cod-liver oil per day will give added fat and vitamin D, but nowadays the latter is usually given in more concentrated form, e.g. 5-10 drops of Adetolin. Fruit juice, tomato or vegetable juice diluted with an equal part of water with sugar to taste, should also be given; about a teaspoonful daily, the amount to be increased as the child gets older.

Pasteurized milk is preferable to plain boiled as it has been kept at a temperature of 150° F. for half an hour.

If this is unobtainable, bring the milk to the boil and cool quickly, stirring the while.

CARE OF BOTTLES.—It is advisable to have two or three bottles in use, and they must be rinsed in cold boiled water, followed by hot water, after each feed, and boiled up daily, being put in cold water which is brought to the boil.

Teats and valves are kept in a screw-topped sterilized jar, turned inside out and cleaned with salt, which is washed off with hot water.

SPOON-FEEDING.—A baby should be trained from birth to take water and fruit juice from a spoon, and as it grows older every artificial feed should be started with a spoon. The feed must be continued with the bottle, as spoon-feeding is a slow process and the food gets cold. The amount is gradually increased until bottles are dispensed with.

COMPOSITION OF CERTAIN MILK AND PROPRIETARY FOODS WHEN RECONSTITUTED

<i>Brand</i>	<i>Protein</i>	<i>Fat</i>	<i>Carbohydrate</i>
Human Milk ..	1.25	3.5	7.5
Cow's Milk ..	3.5	3.5	4.75
Allenbury's Nos. 1 and 2 ..	1.8	3.0	7.5
Cow and Gate ..	3.3	3.4	4.7
Ostermilk ..	2.1	2.5	7.0
Lactogen ..	2.0	3.1	6.6
Trufood ..	1.4	3.5	6.25
Horlick's Milk ..	1.3	1.0	3.8

<i>Condensed Milks</i>	<i>Protein</i>	<i>Fat</i>	<i>Carbohydrate</i>
Sweetened, with 8 parts of water added	1 2	1 3	7 0
Unsweetened, with 2 parts of water added .	3 0	3 1	4 0

**COMPOSITION OF CERTAIN FOODS IN POWDER FORM
INTENDED AS ADDITIONS TO MILK**

Benger's Food .	10 0	1 0	79 0
Farex .	15 0	2 5	71 5
Mellin's Food	10 35	0 15	79 5
Robinson's Patent Barley .	5 1	0 9	82 0
Robinson's Patent Groats	11 3	1 6	75 0

Benger's Food contains wheaten flour and pancreatic extract, which converts most of the starch into dextrin.

Farex contains vitamins, iron and starch.

Mellin's Food contains no starch and is rich in malt.

Robinson's Barley and Groats both contain much starch.

WEANING AND MIXED FEEDING.—Weaning is not a definite stage, reached suddenly, but should be so gradually carried out that the child is used to *additions* to its milk diet from an early age.

All additions must be made gradually and the result observed, but carefully planned; weaning is not the alarming process it used to be.

The modern tendency is to begin solids in minute quantities at 10–12 weeks. Give only half a teaspoonful of vegetable or fruit purée at the 2 p.m. feed (whether breast or artificial). Recipes are given below. Any vegetable (except onion and potato) is suitable, and carrots, cauliflower and cabbage are the most popular. Dried or fresh fruit, stewed in a minimum quantity of water and sieved, may be given; apples are the most popular. If there are no ill effects, though of course the colour of the stools will change slightly, increase the amount very gradually.

In any case, by 5 months or 15 lb. weight, the child can be fed as follows:

Diet from 5 to 9 months

- 6 a.m. (and 10 p.m. if still given) Breast or milk mixture.
- 10 a.m. Breast or milk mixture, followed by one to three teaspoons of cereal (groats, Farex, patent barley, etc.), half a teaspoon of egg-yolk, lightly boiled. If tolerated, increase to two teaspoons, but only give twice a week.
- 2 p.m. Either one or two teaspoons of vegetable purée or rather less fruit purée, or else two teaspoons of bone and vegetable broth. Finish with breast or milk mixture.
- 6 p.m. One to three teaspoons of cereal, followed by breast or milk mixture.
Dry rusk, or bone as an extra.

RECIPES.—*Bone and vegetable broth.*—1 lb. meat bones well broken up. Cover with water and add 1 teaspoon of vinegar. Simmer 4-7 hours. Now add mixed vegetables $\frac{1}{2}$ lb., simmer 1 hour and strain.

Vegetables.—Cut up and cook in smallest amount of water to prevent burning. Shake the pan occasionally, keep covered and cook till tender, and sieve through an enamel or hair sieve.

Rusks.—Cut slices of bread $\frac{1}{4}$ inch thick, dip in sweetened milk and bake till hard.

If the weaning has been begun at 5 months or 15 lb. weight, and nothing except milk given before that, the items in the last table should be introduced one at a time, and the whole process should take from six weeks to two months.

By nine months, increasing gradually, the child should be weaned, and can be fed as follows:

Diet from 9 to 12 months

On waking. 8 a.m.	Fruit juice. $\frac{1}{2}$ cup cereal with 8 oz. milk, half an egg or toast fried in fat, or occasionally a little steamed fish.
Dinner, 12.30 p.m.	1 or 2 heaped tablespoons sieved vegetables, potato (cooked in jacket) moistened with butter or gravy, followed by stewed fruit, jelly or custard.
Tea, 4.30 p.m.	Rusks or bread and butter, with honey, seedless jam or marmite, junket or stewed fruit, cup of milk.
Supper.	Milk and biscuits.

THE NORMAL INFANT.—The average weight of a European baby at birth is between $6\frac{1}{2}$ and $7\frac{1}{2}$ lb.; Indian babies are generally about a pound lighter.

Progress.—Exclusive of the first ten days a healthy child should put on 1 oz. per day of life for the first hundred days and thereafter a pound a month up to the age of one year. (Paterson.)

Teeth.—For the order of eruption, see Dentition.

At 3 to 4 months.—The fovea centralis (macula) of the retina is completely formed, so the child can focus objects and, which is very important, it begins to co-ordinate its movements with its sight; in other words it begins to grasp bright-coloured articles. At this age the child should, if properly trained, empty its bowel when put on the pot. It should begin to recognize people, kicks vigorously and can hold up its head.

At 6 months.—The child tries to sit up, and can turn over on to its face; it notices people and objects at a distance, makes purposeful movements with its hands, and will chew anything put into its mouth.

It should no longer cry without a discoverable reason; indeed,

continued purposeless crying at this age may give the first indication of mental deficiency.

At 9 months.—The child tries to crawl and to pull itself up by the rails of its cot. It can generally utter a few primitive monosyllables such as "ta," "ma," "baba." Children of this age should never be left alone on a chair or bed as they are liable to roll off. If carefully trained they should not require napkins except at night.

At 1 year.—The child should be able to stand alone, though it should never be made to do so; it can string a few simple words together, and will play happily with constructive toys such as bricks.

After the age of one year progress is continued, the child becoming more able to fend for itself, but it is important to note that if a child does not talk fluently by the age of three and has no handicap such as deafness it is probably mentally deficient.

INFLUENZA

There is no specific remedy, but treatment is important in order to avoid any dangerous complications. It is most important even in the mildest cases that the patient goes to bed and remains there until the temperature has been normal for 48 hours; plenty of fresh air is important. At the outset a dose of calomel followed next morning by a saline should be given. Diet should be fluid and in frequent small quantities, with plenty of fruit juice and 2 oz. of glucose daily.

As regards treatment by drugs the remedies that have been recommended are endless; S.U.P. 36, 1 c.c. given intramuscularly, on the first, second and fourth day certainly appears to do good in some cases. The following are useful prescriptions:

B Aspirin.	gr. 5	or	B Sodii Salicylat.	gr. 12
Caffein. Cit.	gr. 1		Phenazon.	gr. 4
Phenacetin.	gr. 2½		Tr. Nuc. Vom.	℥ 5
Pulv. Ipecac. Co.	gr. 5		Liq. Ext. Liquorice	3ss
For one cachet every 4 hours.			Aqua. Chloroformi ad	3j
			Every 4 hours.	

When respiratory symptoms are present

B Vinum Ipecac.	℥ 8
Liq. Amm. Acet.	3ij
Tr. Camph. Co.	℥ 20
Syrup. Pruni Virg.	3j
Aquam ad	3ss

Every three hours.

For severe pains in back and limbs

B Pyramidon.	gr. 5
Phenazon.	gr. 5
Caffein. Cit.	gr. 1
For one cachet. Every 2 to 3 hours for 4 doses.	

For Insomnia

B Medinal.	gr. 5
B Paraldehyd.	3j to 3ij

In very sweet tea.

For troublesome cough

B Syrup. Apomorphinae	℥ 20
Syrup. Codeinae	℥ 20
Syrup. Pruni Virg.	℥ 20

A teaspoonful occasionally.

Chemotherapy, although it has no effect on the disease itself, both prevents and cures most of the complications.

INSOMNIA

Apart from that occurring in physical and mental diseases, which must always be carefully looked for but do not concern us at the moment, insomnia is usually an expression of indecision or anxiety, and much of the anxiety is about the insomnia. Further, in long-standing cases it is largely a habit which probably began when the patient was worried about some episode now long past or even forgotten, but followed by other episodes—real or imaginary—until the patient eventually was not happy unless he was worried.

A sympathetic and detailed inquiry into the origin of the complaint is, therefore, the first necessity in treatment, because it may reveal the cause, and if this is known and "put where it belongs" cure is likely to follow.

Ross makes the interesting point that insomnia is largely confined to the brain worker, and often occurs because the brain remains active during the watches of the night when it ought to be resting; in spite of this, however, the brain worker of fifty is generally a younger man than the manual labourer of the same age who has slept perfectly all his life. Certain monks, after years of training, exist and work on "three handfuls of flour and three hours of sleep" in the 24 hours; this they do without harm, and it is indeed rare for the worst sleeper to have less than three hours' sleep a night.

The physician is, therefore, fully justified in telling the patient that his complaint is not so harmful as he thinks it is; if the patient is convinced that this is so, he will be relieved of much of his worry so will begin to sleep better.

It is not, however, always easy to abolish worry or the consequences thereof, nor is it easy to convert a nervous and excitable patient into a placid one.

In such cases drugs are of great benefit, but it is further necessary to convince the patient, especially the nervous type, that taking a pharmacopoeial dose of a recognized hypnotic does not make him into a drug fiend. Do not make any promises unless there is a very sound reason for doing so; for instance, it is tempting to tell the patient that taking a hypnotic is only a temporary measure and that he will be able to leave it off later, but if it turns out that he is unable to do so, he loses faith in his doctor, so the treatment is likely to fail.

TREATMENT.—It is assumed that a careful examination has eliminated such possible causes as pain, high blood-pressure, uraemia, heart disease, bronchitis, hyperthyroidism, duodenal ulcer or nocturnal frequency of micturition, that the physician has satisfied himself that the trouble is not an early symptom of mental breakdown and that he has used psychotherapy as indicated above.

Adjuvants.—For the office worker, the healthiest and best remedy is an hour's exercise out of doors every afternoon or evening. Bournvita, Ovaltine, Horlick's Milk or warm milk with a little sugar in it, given at bedtime, will often have a soothing effect. Reading in

bed is considered by some to keep people awake, and by others to do the reverse; it depends upon the kind of book. Neither a thriller nor a book about the patient's work should be prescribed, but some quiet domestic novel or one of the more obscure biographies, of which there are many. Religious works are, on the whole, to be discouraged for this purpose because they make the patient think too much.

Indians as a race are much more religious than Europeans, and many practices such as relaxation, meditation and Yoga are conducive to sleep by those who can carry them out, so should be encouraged if they are effective.

In treating a case of insomnia there is no harm in beginning with mild measures if it appears to be a mild case; but if drugs are given they must be given in adequate doses from the start, otherwise the patient will lose both sleep and faith.

DRUGS.—Practically the only drugs used nowadays for habitual insomnia are the bromides and the barbiturates.

The bromides.—Bromides have the advantage of being harmless in ordinary doses and of forming a useful "background" to other hypnotics, thereby making smaller doses of them effective. Bromide Acne, which occurs in some cases, can often be prevented by small doses of arsenic; if not, the drug should be discontinued. In certain people, especially the elderly, bromides markedly dull the faculties, another reason for their discontinuance, and in others they are too anaphrodisiac.

A suitable dose is 10–30 grains of sodium bromide in 10-grain cachets an hour before bedtime. A nervous type of patient may do better if given bromide three times a day, but its effect on the intelligence must be watched.

Children.—Bromides are particularly suitable for children with insomnia or night terrors, and are often combined with chloral hydrate, which also suits children very well; an effective dose for a child of 5–10 years is 5–10 grains of each at bedtime as a draught.

The Barbiturates.—A list including most of these with their dosage, the time to take effect and the duration of sleep is appended. It will be seen that they can be divided into those of quick action and short duration, and those that take longer to act but give a longer sleep. The former are either metabolized or excreted quickly so are not cumulative, whereas the latter, especially the phenobarbitone group, may accumulate in the system if given in too large doses.

There are three kinds of insomnia:

- (a) The patient has difficulty in getting to sleep, but once he goes off he sleeps well. The cause often is that he works late or takes strong coffee after dinner. It is obvious that if a barbiturate is required for this type, one of the quickly-acting-soon-metabolized variety should be given, such as butobarbital, Seconal or hexobarbitone; the writer has a very high opinion of Cyclonal for this disorder.

- (b) The patient has no difficulty in going to sleep, but wakes in the small hours and cannot get to sleep again. This may be associated with high blood-pressure, old age, or disorder of the heart, so these are specially looked for; as already mentioned, a dull book may distract the patient's mind sufficiently in the space of half an hour or less to enable him to go to sleep again, this second sleep, as a rule, being sound. Further, it is advisable for the patient to get up and urinate when he wakes, unless the weather is hot and urinary secretion scanty; otherwise just as he is dropping off to sleep he is apt to think "I must get up and pee."

If, however, a drug is needed, a quickly-acting barbiturate is again the drug of choice.

- (c) A combination of (a) and (b). Here an adequate dose, which may be cut down later (not the other way round), of bromide (15-30 grains) or of one of the slower barbiturates, such as 3 grains of phenobarbitone or 10 grains of barbitone, should be taken an hour before bedtime; if the patient wakes and remains awake in the middle of the night a small dose of a quickly-acting barbiturate will generally send him to sleep again.

It will be noticed that neither counting sheep nor alcohol has been mentioned; the former because it is ineffective and the latter because a dose sufficient to produce sleep soon becomes sufficient to produce inebriety.

SOME OF THE BARBITURATES

<i>Name</i>	<i>Dose</i>	<i>Time to take effect</i>	<i>Duration</i>
Allobarbitone (Dial) ..	1 - 3 gr.	1 - 2 hrs.	6-8 hrs.
Amytal ..	1½ - 5 gr.	½ - 1 hour	2-4 hrs.
Amytal Sodium ..	1 - 3 gr.	½ - 1 hour	2-4 hrs.
Barbitone (Malonal, Veronal)	5 - 10 gr.	1 - 2 hrs.	6-8 hrs.
Barbitone Soluble (Medinal, Veronal-Sodium)	5 - 10 gr.	½ - 1 hour	4-6 hrs.
Butobarbital (Neonal, Soneryl)	1 - 2 gr.	½ - 1 hour	2-4 hrs.
Hexobarbitone (Cyclonal, Evipan, Hexanastaboral)	4 - 8 gr.	10 - 30 mins.	1-3 hrs.
Ortol-Sodium (Hebaral) ..	3 - 6 gr.	½ - 1 hour	2-4 hrs.
Pentobarbital (Nembutal) ..	1 - 2 gr.	10 - 30 mins.	1-3 hrs.
Pentothal ..	4 - 8 gr.	10 - 30 mins.	1-3 hrs.
Phanodorm ..	1½ - 6 gr.	½ - 1 hour	2-4 hrs.
Phemitone (Prominal) ..	½ - 6 gr.	1 - 2 hrs.	6-8 hrs.
Phenobarbitone (Gardenal, Luminal, Sormonal)	½ - 3 gr.	1 - 2 hrs.	6-8 hrs.
Phenobarbitone Soluble (Gardenal-Sodium, Luminal-Sodium)	½ - 3 gr.	½ - 1 hour	6-8 hrs.
Rutonal ..	1 - 6 gr.	1 - 2 hrs.	6-8 hrs.
Sandoptal ..	3 - 6 gr.	½ - 1 hour	2-4 hrs.
Seconal ..	1½ - 6 gr.	10 - 30 mins.	1-3 hrs.

These drugs are often combined with analgesics such as pyramidon or phenacetin and sold *under some proprietary name*, but as they are intended for insomnia caused by pain they are not included in the above list.

INTESTINAL OBSTRUCTION AND PARALYTIC ILEUS II ¹

"The signs of intestinal obstruction are visible, audible, palpable peristalsis and an inability to pass flatus" (Rutherford Morison).

"Post-operative intestinal obstruction comes on 6-10 days after operation, ileus within the first three days" (Hamilton Bailey).

Silent distension without peristalsis is characteristic of paralytic ileus.

Tenderness and rigidity are signs of peritonitis, *not* of intestinal obstruction; if they are present with distension and obstruction they mean "too late".

Patients with intestinal obstruction and a pulse of over 100 generally die whether operated on or not.

Carefully examine the hernial orifices in all cases of suspected intestinal obstruction, and make a rectal examination. Severe vomiting and collapse with "ladder pattern" on the abdomen mean small bowel obstruction.

"In all cases of intestinal obstruction it is far better to spend an hour or two in preparing the patient for operation than to open the abdomen hastily. The modern tendency is to decompress the obstructed intestine by gastric or intestinal aspiration and to improve the patient's general condition by intravenous fluid therapy supplemented by 7 c.c. of anti-gas-gangrene serum before undertaking operation. Conversely, if the case is diagnosed really early before distension has occurred, or there is reason to believe that a loop of intestine is in danger of gangrene, e.g., strangulated hernia, little time should be lost in performing operation" (Hamilton Bailey, *Emergency Surgery*).

Many cases of apparent obstruction are cured by the mere giving of a spinal anaesthetic. In babies, especially plump and healthy ones between the ages of one and three, the common cause of intestinal obstruction is *intussusception*; in adults, strangulated hernia, volvulus or old adhesions, often tuberculous, and in the elderly, carcinoma of the colon (*see also* Intussusception).

INTESTINAL OBSTRUCTION.—With due attention to the general principles just set forth, the treatment is to give a spinal anaesthetic, to wait 15 minutes, and then to open the abdomen by a *sub-umbilical paramedian incision on the right side unless there are indications that the trouble is on the left*. First find the caecum and examine it; if it is collapsed the obstruction is in the small bowel, so work upwards along the ileum until it is found. If the caecum is distended either the obstruction is in the colon or there is no obstruction at all. Work along the colon and if the obstruction is found, deal with it appropriately.

If (as sometimes happens) the way is clear all the way to the rectum, tell an assistant to pass a flatus tube, milk it along the

colon as far as possible and close the abdomen leaving the tube in place. The cause of these cases is puzzling; they are commonest at festival times when large numbers of people after a period of starvation eat a gigantic meal. There would appear to be three possibilities, (1) mechanical obstruction by a mass of food—the writer has never found this, (2) volvulus due to hyperperistalsis—the writer has found this on many occasions, (3) a condition akin to paralytic ileus but with no suspicion of peritonitis; this also the writer has found many times, but it is not easy to explain why in one person a huge meal following starvation should apparently produce hyperperistalsis and in another a sort of paralytic ileus, but the occurrence of volvulus was amply confirmed in post-mortem examinations at Belsen. In India it may have something to do with the kind of food eaten, because the writer has noticed on many occasions that the ileus-like condition occurs after the patient has eaten large quantities of some dark, indigestible cereal. G. N. Sen in a personal communication writes:

"Since we met last I have had further opportunities of operating on partial twists of the small bowel, more ileum cases than jejunum ones.

The history immediately preceding the acute illness is one of having taken a heavy meal (generally at others' expense) of 'Seera' or 'Bajra Kiehri' or 'Barley Roti' with 'Fali'. (The last is a type of small bean which is eaten with its covering—this is tasty but indigestible.) 'Seera' is made of barley fried with a little ghee and lots of gur added. 'Bajra' is millet.

More often than not, discomfort and heaviness, and moderate distension of the abdomen precede the acute severe pains of a colicky nature and the vomiting. In some cases, of course, vomiting and severe colic are the first symptoms.

I am beginning to think that the cases of mild twist are not wholly due to vigorous peristalsis of small bowel, but may be due to gradual upward displacement of distended loops of ileum (normally lying in the pelvis) towards the right hypochondriac region below the liver. The inferior edge of the mesentery has on several occasions been found to be tightly stretched across the terminal ileum, obstructing the lumen".

This very interesting theory, based on the keen observation of a large number of cases, is probably nearer the truth than any other so far advanced. It will be noticed that Mr. Sen says "partial twist"; this may explain those cases in which no twist is found, because the bowel has already untwisted itself, but remains paralysed.

In operating for intestinal obstruction certain practical points are worth remembering. The prominent loop of gut that presents when the abdomen is opened is often just above the obstruction.

The writer's mortality-rate has declined considerably since he adopted the practice of allowing only a short length of gut to be exposed at a time and returned each segment to the abdomen as soon as it had been examined. Wrapping up long coils of intestine

in hot towels can produce enough shock to tip the balance from life to death.

Anastomosing a distended coil to an empty one is a quick way of by-passing the obstruction and may save life.

In urgent cases do not waste time in finding the obstruction; anastomose as just described or put in a Paul's tube.

Before inserting a Paul's tube draw a length of gut out of the abdomen, apply an intestinal clamp to one end, empty a suitable length, then apply another clamp and insert the tube into the emptied, isolated loop. This prevents leakage of highly infective contents.

PARALYTIC ILEUS.—Apart from the condition mentioned above, paralytic ileus is usually the sequel of abdominal operation or childbirth; the writer has seen it occur three times in the same woman after parturition. As already mentioned, it comes on within the first three days and must be distinguished from acute dilatation of the stomach, although the treatment of the latter—continuous aspiration through a Ryle's tube—can be of the greatest benefit in ileus.

Opinion about treatment is divided, some favouring immediate and others delayed action. It depends upon the condition of the patient; the writer's practice is as follows:

If the patient's condition is good, and the pulse below 95, active treatment is indicated.

- (a) Pass a Ryle's tube into the stomach and empty it; pass a flatus tube into the rectum and wait a quarter of an hour.
- (b) If no flatus is passed, give an intramuscular injection of Eserine (physostigmine) Salicylate gr. $\frac{1}{8}$
Carbachol gr. $\frac{1}{16}$
Strychnine Hydrochlor. gr. $\frac{1}{32}$
Pituitrin (preferably P.D. & Co.) 1 c.c.
- (c) Wait 10 minutes and give a turpentine enema.
- (d) If this is unsuccessful wait two hours, during which relief often occurs, especially if a turpentine stupe is applied to the abdomen.
- (e) At the end of or during the two hours, if the patient is uncomfortable, give an injection of morphia gr. $\frac{1}{4}$ and atropine gr. $\frac{1}{16}$.
- (f) Repeat (a), (b) and (c) at the end of 12 hours.
- (g) If after another two hours relief is still not obtained, give a spinal anaesthetic.
- (h) If this fails do a jejunostomy, but first explain to the relatives that the case is desperate.

In severe cases with a quick pulse the insertion of a Ryle's tube at one end and a flatus tube at the other, together with intravenous glucose saline and hypodermic morphia and atropine is the only possible treatment and is followed by more active treatment if the patient improves.

If you operate on inoperable cases the operable ones will not come to you.

INTESTINAL WORMS—See Worms.

INTRACRANIAL HAEMORRHAGE—See Head Injuries.

INTRACRANIAL TUMOURS—See Nervous Diseases.

INTRAVENOUS INJECTIONS

The needle should be fine, but the usual point is ground so flatly that it is apt to catch up and penetrate the opposite wall of the vein, especially a small one; much less difficulty will be experienced if the point is ground to an angle of 45 degrees, which can easily be done on an ordinary oil stone, but the point must be sharp. The side on which the bevel is should always be known; most people have it facing them, in line with the measurement scale on the syringe; others find it easier to have the bevel towards the skin, in which case the needle is fixed the other way round. A syringe with an eccentric nozzle, especially in the larger sizes, is much better than one with a central nozzle.

Manual or tourniquet pressure sufficient to dilate the veins *but not to obliterate the pulse*, is applied to the upper arm, and the skin over the veins is sterilized. A vein in the antecubital fossa or on the dorsum of the hand is generally chosen. The median cephalic (on the outer side of the antecubital fossa) is slightly safer than the median basilic on the inner side, because the latter crosses the brachial artery; the danger of injecting Pentothal into this has already been described. In practice, the largest convenient vein is chosen, which is usually the median basilic.

If the reader will compress the veins of one arm, and when the veins are dilated straighten the arm fully, he will notice that the antecubital veins flatten, but dilate again with the slightest flexion of the elbow; for an intravenous injection, therefore, the forearm is not quite fully extended.

One is generally advised to enter the vein at the side, to slide the needle under the skin for half an inch before making the puncture and to steady the vein with the other thumb. The first two pieces of advice merely add unnecessary difficulties, so should not be followed. The trouble about steadying a vein is that the pressure makes it collapse, so it should be steadied some inches from the site of puncture, preferably distal to a tributary; an alternative is to steady the vein proximal to the puncture and make the injection slowly against the blood-stream.

In any case, the needle is held at about 10 degrees to the skin; a distinct sense of resistance, like puncturing a second and thinner skin, is felt as the point enters the vein; the needle is now held as flat as possible against the skin and the point pushed a short distance along the vein, after which a little blood is drawn from the vein into the syringe; the upper arm pressure is now removed and the injection begun.

DIFFICULTIES.—The needle and syringe recommended above are the best prophylaxis against difficulties.

If the veins are small, the arm should be allowed to hang over the edge of the table and a light tourniquet or, better, the cuff of a sphygmomanometer at 40–60 mm. Hg, used instead of manual compression; the patient should also be given a roller bandage to hold and instructed to open and close his fist alternately. If these measures fail, a hot fomentation may be applied to the vein for a few minutes or another vein sought. The last resort is to dissect out the vein under a local anaesthetic.

If the needle slips out of the vein it should be reinserted in the other arm. Varicose veins, although big, are not recommended, because the circulation in them is both sluggish and uncertain.

INTUSSUSCEPTION

This is both commoner and more acute in infants than in adults, in whom it is generally due to the bowel's efforts to get rid of a polypus or growth.

A previously healthy male child between the ages of one and three is the commonest victim of acute intussusception. The signs are severe vomiting, collapse, the presence of a lump in one or other iliac fossa and the passage of blood by the rectum.

The doctor newly arrived from England is apt to diagnose infantile dysentery as intussusception, but the doctor trained in India must be careful not to do the opposite.

TREATMENT.—Palliative treatment, especially in early cases, is successful in about 60% of cases, so is worth trying. Hamilton Bailey recommends the following method:

- (a) Take a douche can, four feet of rubber tubing and a stout catheter or stomach tube, and connect them up.
- (b) With the patient in the theatre and everything ready for a laparotomy, anaesthetize the child; in experienced hands a spinal anaesthetic is the best.
- (c) Fill the douche can with warm saline, insert the unlubricated catheter into the patient's anus, lift the douche can $3\frac{1}{2}$ feet and let the saline flow into the child's rectum for four minutes, pinching its buttocks to prevent escape of fluid.
- (d) Remove the catheter and let the fluid flow out of the anus.
- (e) Repeat twice.

If this is successful flatus and faeces are passed and the lump disappears. If there is doubt or failure open the abdomen. The writer uses a right paramedian incision because it gives the best access with the least trauma and can be enlarged if necessary. Find the intussusception and if possible bring it out of the wound.

The method of reduction is much the same as for a paraphimosis; press from the apex, trying to squeeze the inner layer out of the outer, like tooth paste out of a tube, and just as we do not pull on tooth paste, do not pull on the inner layer of gut or it may tear, with fatal consequences. In difficult cases gently insert a lubricated

Vitamin C (ascorbic acid), 25 milligrams three times a day, may be given, and to prevent hæmorrhages vitamin K.—Coropbyllin (Glaxo), Synkamin (P.D. & Co.), or one of the products of other first-class firms.

In the event of a severe hæmorrhage give a transfusion of fresh (not stored) blood and intravenous vitamin K.

OBSTRUCTIVE JAUNDICE.—The next most common cause of jaundice is obstruction of the common bile-duct or its tributaries, generally by a stone, sometimes by a growth, particularly in the head of the pancreas, and occasionally by a roundworm in the common bile-duct, by a bydatid cyst, or by enlarged glands in the portal fissure, either secondary to a growth or occurring in Hodgkin's disease.

OTHER DISEASES OF THE LIVER CAUSING JAUNDICE.—

Acute Yellow Atrophy, generally the result of a poison, such as chloroform, arsenic (especially anti-syphilitics), trinitrotoluol, phosphorus or snake venom. The jaundice is very deep and generally the patient dies.

Malignant growth of the liver or gall-bladder.

Malarial hepatitis and blackwater fever.

Amoebic abscess.

Yellow fever.

Spirochaetosis icterohaemorrhagica (Weil's disease).—This occurs in miners and others who become infected by the urine and possibly the faeces of rats, the infection being from infected mud or slime through an abrasion, or sometimes from drinking infected water. Treatment is with penicillin.

ICTERUS NEONATORUM.—

A mild degree, due to slight hæmolysis, appearing about the third day and lasting for about ten days, is almost physiological.

Icterus gravis is a much more severe condition of unknown origin, but possibly due to a hæmolytic toxin. It appears on the first day and the child becomes very ill in a few days. The former mortality of nearly 100% has been greatly reduced by blood transfusion. This is carried out by transfusing previously matched blood of a suitable group into the superior longitudinal sinus through the anterior fontanelle; two ounces, repeated several times if necessary, are injected.

Septic Icterus is due to infection through the umbilical vein; the only hope is the giving of penicillin.

Congenital syphilis may cause jaundice in the new-boro.

Congenital absence of the bile ducts is rare, and causes a deepening, fatal jaundice.

Hanoi's cirrhosis is generally considered to be due to absence of the bile-ducts or to an ascending infection of them.

HAEMOLYTIC JAUNDICE.—Acholuric jaundice, due to increased fragility of the red cells, is not a fatal complaint and is cured by splenectomy. In various diseases, notably malaria and the

anaemias, a certain amount of *bilirubin* gets into the blood-serum, causing an icteric tinge.

The method of performing, and the clinical significance of van den Bergh's test are described under Simple Laboratory Methods.

JAW—Dislocation of—*see* Dislocations.

Fracture of—*see* Dental Surgery.

JAW—OSTEOMYELITIS OF

This occurs in two forms, general and localized.

GENERAL.—

- (a) In pyaemia, as with other bones, a septic embolus may occlude the main artery. The inferior dental artery being the main blood supply of the lower jaw, occlusion is followed by necrosis.
- (b) Cancrum oris is a very severe infection occurring in debilitated children suffering from some exanthem, most commonly measles, but in India it is more usually smallpox.
- (c) Unskilful attempts to remove septic teeth, especially when a heavy-banded person has broken the jaw. Three times the writer has had to remove the whole necrotic mandible for this condition, the patients all being elderly and with severe pyorrhoea.
- (d) Actinomycosis of the lower jaw is not uncommon where the disease is endemic; treatment is with penicillin.
- (e) In the days when matches were made from yellow phosphorus instead of from red phosphorus, Phossy Jaw was rampant amongst the workers.
- (f) Heavy metals, such as mercury, bismuth and arsenic, all of which are used in the treatment of syphilis, affect the mandible of certain persons who are abnormally susceptible. The moral is obvious.
- (g) Radium, when used for cancer in the mouth, may cause a painful and chronic osteomyelitis of the jaw.

TREATMENT.—In the acute stage, vigorous chemotherapy (*q.v.*) is the treatment; this also applies to actinomycosis. Local cleanliness is also observed, and any loose teeth are removed.

When a sequestrum forms, which may take longer than the usual six to eight weeks as in the case of other bones, it should be removed through an incision along the gum. This "filleting" operation can generally be done through the mouth, an outside scar being thereby avoided. The mandible regenerates very well. If only one side is affected a dentist should be consulted, so that every effort may be made to keep the sound side from being drawn over to the affected side, but it is very difficult to maintain symmetry.

LOCALIZED.—As every fracture of the jaw is a compound one, and as many jaws contain septic teeth, it is not surprising that localized osteomyelitis occurs at or near the fracture.

A septic tooth can cause localized osteomyelitis, the sequestrum coming away with, or a considerable time after, the tooth.

JAW—TUMOURS OF

These may be secondary, which are, of course, always malignant, or primary, which may be innocent or malignant, the latter being sarcomata.

Stout divides cysts arising from the teeth into three varieties.

- (a) Dentigerous cyst, the relic of paradental epithelial rests in the bone.
- (b) Adamantinoma, derived from the enamel organ.
- (c) Odontome, a compound structure arising from the tooth germ.

Cysts may be scraped and carbolized, compound tumours may be excised without fracturing the jaw, and adamantinomata are best treated by deep X-ray therapy.

JOINTS—TUBERCULOSIS OF

This is commonest in the young, but more rarely occurs in older patients. There are two types, (1) blood-borne tuberculous synovitis, and (2) the more severe condition that results from the rupture into the joint of a neighbouring tuberculous abscess of bone.

Success in treatment depends upon early diagnosis before tissue destruction has ruined the joint. Careful X-ray examination is therefore necessary; rheumatism, gonorrhoea, osteomyelitis, infective arthritis, trauma, haemophilia and sarcoma are the chief conditions to be excluded.

TREATMENT.—The essential is complete immobilization of the joint until all symptoms have been absent for six months, which means about nine to twelve months' immobilization altogether. The general resistance of the patient is also raised by means of fresh air, good food and heliotherapy—which may be by natural or by artificial sunlight. From all of this it will be seen that treatment is best carried out, or at least begun, at a sanatorium in the hills.

If this is impossible, it may be useful to remember a few facts.

- (a) The positions in which the various joints will be most useful if ankylosis should occur, and in which they should therefore be immobilized are as follows:

- | | |
|---------------|---|
| <i>Ankle:</i> | At right angles, with the foot in very slight inversion. |
| <i>Elbow:</i> | At right angles, with the forearm half-way between pronation and supination. |
| <i>Hip:</i> | About 10 degrees flexion and 10 degrees abduction. |
| <i>Knee:</i> | About 5 degrees short of absolute straightness. The reason for this is that if the knee is put up perfectly straight the head of the tibia may become posteriorly dislocated. |

Shoulder: Just short of 90 degrees abduction in children. In adults, less than this, depending upon the mobility of the scapula.

Spine: In the normal curves or slightly extended.

Wrist: About 35 degrees of dorsiflexion.

- (b) When immobilizing a joint, include the one above and the one below.
- (c) As swelling subsides and muscles atrophy, plaster becomes loose; it therefore needs replacing after two and again after six weeks, by which time the muscle atrophy reaches its maximum.
- (d) If there is pain after immobilization, either the immobilization is not complete, or spasm of the muscles is causing painful contact of the inflamed surfaces, in which case traction is required. Spasm causing "night starts" is particularly common in tuberculosis of the knee.
- (e) Many ingenious splints and frames have been devised, but plaster of Paris properly applied is better than most of them.
- (f) The presence of sinuses means secondary infection or the presence of dead tissue. Chemotherapy, immobilization, removal of dead tissue and ample fresh air in a good climate are the best remedies. Most sinuses thus treated will heal within three months.
- (g) It takes between three and five years to cure a tuberculous joint.
- (h) If the lesion has been caught early, when only the synovial membrane is affected a movable joint may be expected, otherwise fibrous or bony ankylosis is the best we can hope for.
- (i) Excision of a tuberculous joint is now an almost obsolete procedure, but is occasionally done to promote firm bony ankylosis.
- (j) If there is an abscess, open it with the strictest aseptic precautions, and if a joint is tensely distended with fluid aseptic aspiration is both comforting and therapeutically useful.

KALA-AZAR—*See* Leishmaniasis.

KELOID

This is best avoided by rigorous exclusion of sepsis, and by careful approximation of the edges of the wound. Severe cases are generally the result of burns, and excision, where possible, followed by careful suturing is the best treatment. The application of X-rays to a recently healed wound considerably lessens the risk of keloid and even has a beneficial effect on it when it has formed. Coloured races are much more liable to the condition than are the white races.

KERATITIS—*See* Eye.

KIDNEY—*See* Calculi, Nephritis and Pyelitis.

KIDNEY, MOVABLE

PALLIATIVE TREATMENT.—

- (1) By rest and an endeavour to increase the body fat, with the idea of making the kidney less mobile by the deposition of more fat around it.
- (2) By wearing a mechanical apparatus—either a kidney truss or an abdominal kidney belt; these must be very accurately fitted and invariably applied when lying down.

No operative treatment should be performed if there is general visceroptosis or severe neurasthenia without symptoms referable to the kidney. Operation will be necessary if undue mobility is causing kinking of the ureter, or harmful pulling on other organs, or if the patient has to perform manual labour and cannot afford a belt, but in all cases palliative treatment should be tried in the first place.

Disregarding classical advice, the writer generally tells a patient if she has a movable kidney, but at the same time explains that it is of no consequence. If operation is necessary the best one is to open the capsule on the posterior aspect of the kidney and stitch it to the psoas muscle.

KNEE JOINT—INTERNAL DERANGEMENT OF

This rather vague, old-fashioned term generally means "torn semilunar cartilage", but it also includes most of the other conditions which can cause "water on the knee", such as torn or strained ligaments or loose bodies in the joint.

DISPLACED OR TORN SEMILUNAR CARTILAGE.—The first time this happens the cause is a sudden twisting of the foot while the knee is flexed; subsequently, more trivial accidents can cause it, until the patient can very often do it voluntarily.

The condition is nine times as common in the internal cartilage (medial meniscus) as in the external, and the leading symptom is a sudden and sickening pain in the joint with an inability to straighten it fully without pain—so called "locking"; this is quickly followed by an effusion of synovial fluid into the joint.

Immediate treatment.—This is by reduction of the displaced, torn cartilage and ultimate treatment is by operative removal of the offending cartilage. The late Sir Robert Jones's method of reduction is as follows:

- (a) Fully flex the patient's knee and rotate the foot inwards.
- (b) Holding the patient's foot in one hand and placing the other above his knee, tell him that when you count three you want him to kick his leg straight.
- (c) Say "One, two, three—Kick." As the patient kicks, help him by pressing the thigh downwards and lifting the foot upwards, at the same time rotating the foot outwards.

If this method does not work with the patient conscious, an anaesthetic may be given and the knee put through similar movements.

Under modern conditions and with what we might term chemotherapeutic prophylaxis combined with the strictest asepsis, operations on the knee are no longer liable to be followed by sepsis; the ideal treatment is therefore to remove the whole cartilage. Recurrent displacement ultimately causes arthritis.

Note.—In all operations on the knee joint (or any other joint) the fullest co-operation of the patient is essential to success. If the will and perseverance necessary to recovery are absent, no amount of skilful treatment will produce a fully functioning joint, and, further, the patient will soon be saying that all his troubles date from the operation.

After-treatment.—The main points in after-treatment are (1) efficient quadriceps drill, in which the patient voluntarily contracts the muscle many times a day, and (2) early voluntary active movement.

Beware of operating on a joint which furnishes a pension or prevents the patient from performing an unpleasant duty.

INJURIES OF THE LATERAL LIGAMENTS.—Sprain is a common injury and follows either a twist, or a blow on the opposite side of the knee.

An elastic bandage may be applied, and massage helps the absorption of synovial fluid. The side of the shoe should be built up so as to take the strain off the affected side of the knee, and quadriceps drill must be carefully carried out.

Rupture of the ligament follows a severe blow or crush which forces the knee inwards. Sometimes the torn end of the ligament can be felt, in which case an operation is performed for stitching it. Otherwise plaster of Paris is applied for ten weeks, the time it takes a ligament to join. Throughout all treatment quadriceps drill is essential.

THE INFRAPATELLAR PAD OF FAT.—This sometimes becomes chronically inflamed from repeated trauma and gets nipped when the knee is straightened.

Treatment.—This is by rest, massage and Antiphlogistine, or by excision in severe cases.

INJURIES OF THE CRUCIAL LIGAMENTS.—These are dealt with under Dislocations.

LOOSE BODIES IN THE JOINT.—If these are radio-opaque they should be carefully localized before removal.

KNOCK-KNEE

As the common cause is rickets, vitamin D therapy combined with sunshine, fresh air and fresh food is begun at once.

In children under five years of age there is a natural tendency for the limbs to grow straight if the patient is not allowed to put any weight on them. A splint along the outer side of the limb and projecting beyond the foot achieves this; the splint should be well padded at the ends and the knee should be firmly bandaged to it

with a crêpe bandage. Cure takes two or three months. Later, when the child is allowed to walk, the inner side of the shoe should be raised about one-third of an inch and a side brace may be fitted to the shoe below and strapped to the thigh above, with a joint at the knee.

In older patients, "persuasive" methods with splints may be tried, but if the condition is severe supracondylar osteotomy will be required.

LABORATORY METHODS (SIMPLE)

THE BLOOD.—

RED-CELL COUNT.—The diluting fluid is made up according to either of the following prescriptions:

Sodium Chloride	..	..	..	1 part
Sodium Sulphate	..	..	..	8 parts
Glycerin	..	..	..	30 parts
Distilled Water	..	..	..	160 parts

This fluid shows the cells very clearly but is apt to grow moulds in course of time, so requires filtering.

The following fluid is not quite so easy to work with, but being antiseptic does not grow mould.

Sodium Chloride	..	..	..	1 part
Sodium Sulphate	..	..	..	5 parts
Perchloride of Mercury	..	..	..	0.5 part
Distilled Water	..	..	..	200 parts

Method of Counting.—With a Thoma-Zeiss apparatus draw blood up to the 0.5 mark and then fill with diluting fluid. Shake well. Put the special cover slip on the counting slide. Blow out a few drops from the pipette and then put a small drop on the slide at the edge of the cover slip; the drop should now fill the space between slide and cover slip. If there is too much or too little, wash and dry the slide and cover slip and try again.

Put the slide on the stage of the microscope and with the lowest power make sure that the central lined portion is in the centre of the field. The condenser should be some distance below the stage and may be stopped down if necessary.

Engage the $\frac{1}{2}$ -inch objective, focus as required and begin counting. Count five complete large squares each containing sixteen small squares; add up the five numbers thus obtained, add four noughts and the result is the number of cells per cubic millimetre. For example:

92
106
90
87
95

470 add four noughts = 4,700,000.

In counting the squares, take care not to count twice those cells which are touching the lines.

WHITE-CELL COUNT.—This is carried out in the same way as the red-cell count, the diluting fluid being:

Acetic Acid	:	..	..	1 part
Distilled Water	:	.	..	100 parts

to which a little colouring matter such as gentian violet may be added to give it a mauve tint.

Method of Counting.—With a Thoma-Zeiss apparatus, draw up blood to the 0.5 mark and then fill with diluting fluid. Shake well, keeping a finger on the tip of the pipette; the white-cell pipette has a wider bore than the red-cell pipette, so fluid may escape if this is not done. Then proceed as in counting red cells, but the white-cell count can be best done with a $\frac{1}{2}$ -inch objective, under which the white cells show up quite clearly.

Count all the cells inside the boundaries of the ruled area including those on the narrowly ruled parts, multiply by 200 and the result is the number of leucocytes per cubic millimetre.

HAEMOGLOBIN ESTIMATION.—An accurate estimation is difficult by ordinary methods but the Tallqvist blotting-paper method gives tolerably accurate results. In an emergency a rough and ready estimate can be made if the practitioner pricks his own finger and compares his blood on a piece of blotting-paper with that of the patient.

The Sahli-Adams haemoglobinometer is slightly more accurate and is used as follows:

Into the square, graduated test-tube drop about 6 minims of decinormal hydrochloric acid.

Draw up enough of the patient's blood to reach the mark in the special pipette.

Blow the blood into the hydrochloric acid and stir rapidly with the glass rod provided.

Draw up water two or three times into the pipette and blow it into the test-tube, stirring each time.

Slowly add enough water to the blood solution in the test-tube to produce an exact match with the colour of the glass in the special holder. The level of the liquid on one side shows the percentage and the number of grammes of haemoglobin on the other side.

MICROSCOPICAL EXAMINATION OF THE BLOOD.—In order to get a good, thin film it is essential to have a clean, grease-free slide. The best way to clean a slide is to put it in hot soapy water and then to wash it with running warm water, after which it is dried and polished with a clean, greaseless rag. Very dirty slides should be washed in hot water and then left overnight in a solution of:

Potassium Bichromate	:	..	..	1 part
Sulphuric Acid	:	.	..	1 part
Water	:	..	..	10 parts

and then rinsed and dried as above.

Put a small drop of the patient's blood near one end of the slide and gently draw the end of a second slide through the drop and

along the slide so as to make an even film. The film should be narrower than the slide so that the edges can be examined, as it is here that leucocytes and malarial parasites are best seen.

STAINING METHODS.—

Leishman's Stain.—From a pipette drop enough stain to cover the film. Leave for half a minute and then add twice the volume of neutral or faintly-alkaline distilled water. Leave for seven minutes and gently wash with tap water until the film is pink. Dry in warm air and examine.

Giemsa's Stain.—(a) Slow method. Fix the film with methyl alcohol for one minute. Then drop on a one in twelve dilution of Giemsa stain and leave for twenty minutes. The higher the dilution and the longer the stain is allowed to act, the better the result.

(b) Rapid method. Fix as above, then drop on a mixture of one part stain to two parts of distilled water and leave for five minutes.

After either method of staining gently wash the film with tap water until it is rose-pink.

Simeon's Method.—The solutions are prepared as follows:

No 1 (Eosin)

Eosin	1 part
Distilled Water	1,000 parts

No. 2 (Stevenel's Blue)

(a) Methylene Blue	1 parts
Distilled Water	1,000 parts
(b) Potassium Permanganate	1 part
Distilled Water	75 parts

Mix (a) and (b). A heavy precipitate forms immediately; put the flask containing the mixture into a water-bath and keep at boiling point for half an hour, during which the precipitate dissolves. Filter into a clean bottle.

The stains are used as follows:

Fix the film with alcohol for	1 minute
Rinse with tap water	4 seconds
Dip in eosin solution	10 "
Rinse with tap water	4 "
Dip in Stevenel's Blue	15 "
Rinse with tap water	4 "
Dip again in eosin	10 "
Rinse with tap water and allow to dry.	

Thick Blood Drops.—These can be stained with a one in twenty dilution of Leishman's or Giemsa's stain which is left on for half an hour. These drops are not fixed before being stained and the stain must be washed off very carefully or the drop will be washed off too. Although thick drops are preferred by some experienced workers, the novice when examining blood for malaria is advised to use the thin film. Thick drops can also be stained by Simeon's method as follows:

Dip the unfixed slide in Stevenel's blue for 5 seconds, moving it gently
Dip in water (distilled) for 5 seconds
Dip in eosin solution for 10 seconds
Dip in distilled water and dry.

BLOOD-SUGAR AND BLOOD-UREA ESTIMATIONS.—These should be carried out in a well-equipped laboratory as both procedures are complicated, and require special apparatus and reagents.

BLOOD SEDIMENTATION RATE.—Westergren's method is the one most commonly used and is carried out as follows:

Requirements.—

- A set of Westergren tubes complete with rack
- Test-tube marked at 5 c.c.
- Pipette holding 0.5 c.c.
- 3.8% solution of sodium citrate.

Method.—With the pipette draw up 0.5 c.c. of the sodium citrate solution and put it in the test-tube.

Draw off 5 c.c. of blood in a dry syringe and gently squirt 4.5 c.c. into the test-tube without causing froth; the citrate and blood mixture should come exactly to the 5 c.c. mark.

With a thumb on the open end, invert the test-tube a few times so as to mix the citrate and blood.

Fill Westergren tubes exactly to the 0 mark, and put in the rack; see that the joint at the bottom is watertight and remove the finger; also see that the tube is vertical. The best room-temperature is between 70° and 80° Fahrenheit. Read after 30 and again after 60 minutes.

In normal men the fall is between 0 and 15 millimetres in the first hour, and in women between 0 and 20 millimetres.

Significance.—The rate of fall is increased during the last six months of pregnancy and in certain diseases, notably rheumatic fever, tuberculosis, leprosy and malignant disease; an increase in the rate of fall coincides with or slightly precedes an increase in the activity of the disease. When there is a focus of inflammation the rate of fall is more or less proportional to the leucocyte count.

CEREBROSPINAL FLUID.—Normally the fluid is clear, colourless and not under pressure, issuing from the needle at the rate of about one drop per second.

Yellow fluid occurs in "Froin's Syndrome" which indicates blockage of the spinal canal above the site of puncture; the fluid is also yellow in jaundice and some time after intrathecal haemorrhage.

Blood in the fluid may come from a vessel punctured by the lumbar-puncture needle; in this case it becomes less as the fluid flows. After injury, bright blood mixed with the fluid indicates intracranial or intraspinal haemorrhage.

Cloudiness of the fluid indicates inflammation and is caused by leucocytes; generally it indicates meningitis.

In tertiary and sometimes in secondary syphilis and in syphilis of the nervous system the Kahn and Wassermann reactions are positive.

Protein is normally so scarce that the usual tests are negative. When much protein is present the fluid coagulates on boiling. It is increased in all acute inflammations and in spinal block. It may be increased in cerebral tumour but is usually normal in encephalitis

lethargica. If the fluid coagulates after standing for some hours, it indicates meningitis, the "spider's-web" coagulum suggesting tuberculous meningitis, but it is also found in benign lymphocytic meningitis.

Glucose in normal fluid is between 0.05% and 0.08%; it is reduced in all inflammatory conditions "because the germs eat the sugar" (Kinnier Wilson).

Chlorides are reduced in tuberculous meningitis and in acute meningitis.

Leucocytes normally are almost absent; the presence of polymorphs indicates acute inflammation, and a lymphocytosis occurs in tuberculous, syphilitic and virus infections and in benign lymphocytic meningitis. A mixed leucocytosis occurs in intracranial abscess, sinus thrombosis and cerebral softening.

SPUTUM EXAMINATION.—The importance of examining the sputum in all possible cases of pulmonary tuberculosis has already been emphasized and will be emphasized again here.

The specimen should be coughed up first thing in the morning as this may be the only one to contain tubercle bacilli, but if a patient is obviously coughing up lung sputum to the consulting room a specimen may be taken and examined immediately.

Naked Eye Examination.—Observe the colour, consistency, quantity, smell and the tendency to settle into layers.

Microscopical Examination.—With a swab-stick remove a portion of the most purulent-looking sputum, spread it evenly on a slide, then fix and dry it in a spirit flame.

Pneumococci.—These stain well and show their capsules by Jensen's modification of Gram's method:

0.5% Methyl Violet—30 seconds

Pour off, then pour on Lugol's Iodine

Pour off, then pour on second quantity of Lugol's Iodine—30 seconds

Decolorize with absolute alcohol—not more than 90 seconds

Pour off alcohol and pour on 0.5% Neutral Red—15 seconds

Wash in distilled water, dry and examine.

Tubercle Bacilli.—Ziehl-Neelsen method. The following solutions are required:

- (1) Carbol-Fuchsin, as follows:

Basic Fuchsin	..	..	1 part
Absolute Alcohol	..	..	10 parts
1 in 20 Carbolic Acid	..	..	90 parts

- (2) 25% Hydrochloric Acid or Sulphuric Acid

- (3) Loeffler's Methylene Blue, as follows:

Saturated solution of Methylene Blue in Alcohol	..	..	30 parts
1% Caustic Potash Solution	..	..	1 part
Distilled Water	..	..	100 parts

Cover the fixed slide with carbol-fuchsin and heat over a spirit lamp till steam rises (do not boil)—5 minutes

Decolorize with acid till pink under tap

Cover with Methylene Blue—1 minute

Wash, dry and examine.

STAINING METHODS.—

GRAM'S METHOD OF STAINING.—Prepare the following solutions:

- (a) Crystal Violet 2 parts
 Pure Methyl Alcohol 100 parts
 (This is easier to make and gives better results than aniline gentian violet)
- (b) *Gram's Iodine, which consists of:*
 Iodine 1 part
 Potassium Iodide 2 parts
 Water 300 parts
- (c) The counterstain, which may be 1% Eosin, 1 in 20 dilution of Carbol-Fuchsin, a saturated solution of Bismarck Brown or, better, a 1% solution of Safranin in water.
- (d) Absolute Alcohol.

Method.—

Fix smear with alcohol or heat
 Apply crystal violet solution—30 seconds
 Wash with water
 Apply Gram's Iodine—30 seconds
 Wash with alcohol till no more colour comes off
 Counterstain for 30–60 seconds, wash, dry and examine.

The following organisms stain purple, i.e., are *Gram-positive*.

Anthrax Bacillus
B. aerogenes capsulatus
 Diphtheria Bacillus
 Pneumococcus
 Staphylococcus
 Streptococcus
 Tubercle Bacillus—with difficulty
 Tetanus

The following take the colour of the counterstain: *Gram-negative*.

Micrococcus entorrhalis
Gonococcus
Micrococcus meningitidis
Micrococcus melitensis
 Colon-Typhoid-Dysentery Group
 Cholera Vibrio
 Friedländer's Pneumobacillus
 Koch-Weeks Bacillus
 Morax-Axenfeld Bacillus
 Pyocyaneus Bacillus

NEISSER'S METHOD OF STAINING DIPHTHERIA BACILLI.—The following solutions are required:

- (a) *Neisser's Acid Methylene Blue.*
 Methylene Blue 0.1 part
 Alcohol 2 parts
 Glacial Acetic Acid 5 parts
 Distilled Water 95 parts
- (b) Gram's Iodine.
 (c) Counterstain.

Method.—

On the fixed film pour a few drops of Neisser's blue solution—3 minutes
 Pour off blue solution and apply Gram's iodine—30 seconds
 Rinse with alcohol or water
 Apply counterstain—30–60 seconds
 Rinse, dry and examine.

The granules of the bacilli are stained an intense blue, whereas the protoplasm takes up the colour of the counterstain.

Diphtheria bacilli can also be stained with any of the ordinary stains, the characteristic being the "H" formation in which they lie. The quickest method of staining is to put on a drop of Neisser's or Loeffler's methylene blue and to apply a cover slip immediately; by the time a drop of cedar-wood oil has been applied to the cover slip and the organisms have been focused they have taken up the stain.

Malaria Parasites, see above under Blood—Staining Methods.

Vincent's Angina and *Relapsing Fever* organisms are stained in the same way, as are *Leishman-Donovan bodies*.

Although *Tetanus Bacilli* are called Gram-positive, sometimes only the spores stain.

Gonococci and *Meningococci*; stain two films, one with methylene blue and the other with Gram's stain. Both organisms are intracellular and Gram-negative.

Leprosy Bacilli, stain as for Tubercle Bacilli.

Plague Bacilli, *Cholera Vibrios* and most other common organisms stain well with methylene blue or dilute carbol-fuchsin.

Spirochaeta Pallida (*Tr. pallidum*).—This stains a pale reddish-purple with dilute Giemsa in which it should preferably be left overnight.

The *Indian ink* method is carried out as follows:

Mix the suspected exudate with an equal quantity of good Indian ink; make a fairly thick film on the slide, allow to dry, and examine with the oil-immersion lens; spirochaetes show white.

Fontana's Silver Method.—

Dry the film thoroughly.

Wash with the following solution:

Glacial Acetic Acid	1 part
Formalin	2 parts
Water	100 parts

Wash with alcohol and dry

Apply 5% tannic acid in water and heat until the steam rises

Rinse in water

Apply Fontana's silver solution, heat until steam rises, and allow to cool

Wash, dry and examine. Spirochaetes are black or brown.

Fontana's silver solution is made as follows:

Take a 5% solution of silver nitrate in distilled water, and add dilute ammonium hydrate drop by drop until the precipitate which first forms just disappears on shaking. Then add 5% silver nitrate solution until the precipitate just reappears.

INSTRUCTIONS FOR THE COLLECTION AND DESPATCH OF PATHOLOGICAL SPECIMENS TO A LABORATORY FOR EXAMINATION AND REPORT

Specimens should be despatched in wide-mouthed glass bottles of about 1-ounce capacity, containing:

<i>Zenker's Fluid</i>	
Bichromate of Potash	℥iii
Corrosive Sublimate	℥vii
Glacial Acetic Acid	℥vii
Water	℥xiv

The following information should invariably be sent.

- (i) If specimen is (a) Organ, (b) Tumour, (c) Morbid Tissue.
- (ii) Clinical diagnosis, if made.
- (iii) Short clinical history, with reference to duration and supposed causation.
- (iv) If specimen is an organ, give details of naked-eye appearance as to colour, change in size, weight and consistence.
- (v) If specimen is a tumour, state:
 - (a) Exact situation from which removed.
 - (b) Whether or not attached to surrounding structures; if attached, to what structures.
 - (c) Size and consistence (hard, soft or caseous).
 - (d) Encapsuled or infiltrating.
 - (e) Glandular enlargement or metastatic growths.
- (vi) If morbid tissue, such as curetting, scrapings, ulcer, etc., give:
 - (a) Exact situation.
 - (b) Naked-eye appearance.
 - (c) Involvement of surrounding structures; if so, give details.
 - (d) Glandular enlargement.

EXAMINATION OF URINE

PHYSICAL EXAMINATION

QUANTITY.—This is usually about 50 oz. or 1,500 c.c. in the twenty-four hours. The amount is almost directly proportional to the weight of the individual. If the amount is diminished to about 800 c.c. oliguria exists.

Oliguria occurs in heart failure, parenchymatous nephritis, severe hæmorrhages, cholera, dysentery and febrile diseases.

Polyuria exists when the volume exceeds 2,500 c.c. It occurs in diabetes mellitus and diabetes insipidus in which it may be as much as 50 litres; it is also seen in certain nervous diseases, chronic nephritis and amyloid disease.

SPECIFIC GRAVITY.—It is of special importance that a 24-hour specimen be examined. It is normally 1.015–1.025; high specific gravity is seen in acute nephritis, albuminuria and diabetes mellitus. Low specific gravity occurs in chronic nephritis and diabetes insipidus.

COLOUR.—The colour is normally from very pale yellow to dark yellow. Urine containing blood is smoky-brown or red, and even may be a deep black. In febrile conditions uroerythrin colours the sediment of urates brick or orange-red. The colour in jaundice may be brown, green or dark yellow.

A number of drugs change the colour of the urine:

Santonin causes it to be, if acid, yellow; if alkaline, purple.

Senna causes it to be, if acid, red; if alkaline, yellow.

Methylene blue causes it to be green, if acid.

Rhubarb turns it brownish-yellow.

Drugs which irritate the kidneys make the urine darker.

Phenol may cause it to be brown.

Sulphonal may cause it to be very dark.

Diuretics, by increasing the amount of urine, cause it to be lighter.

REACTION.—Normal urine is always acid. On standing urea decomposes into ammonium carbamate and ammonium carbonate. Permanent alkalinity may occur in typhoid, intestinal haemorrhage, anaemia and nervous diseases.

DEPOSITS.—Cloudy deposit is generally due to mucus.

Reddish or dark-brown deposit, which dissolves on heating, is due to urates, a scanty deposit like Cayenne pepper is uric acid.

Flocculent deposits generally consist of phosphates of lime or magnesium.

QUALITATIVE EXAMINATION FOR ALBUMIN

(a) **BOILING.**—The upper inch of a column of urine is boiled in a test-tube; if it remains perfectly clear, the reaction being acid, no albumin is present. Turbidity may be due to albumin or phosphates. Add a drop or two of dilute acetic acid; any turbidity which remains is due to albumin.

(b) **HELLER'S TEST.**—With a pipette pour pure nitric acid up to $\frac{1}{2}$ in. into a test-tube; allow some urine to flow gently on to the surface. If after standing half a minute no opaque ring appears at the junction of the two fluids, albumin is absent.

This test is capable of reacting to 0.002% of albumin.

(c) **SALICYLSULPHONIC ACID.**—Add a saturated solution of this substance, drop by drop, to the urine. A cloudy precipitate indicates albumin. The test is very delicate.

QUANTITATIVE ESTIMATION OF ALBUMIN

(a) **BOILING.**—A rough idea of the quantity of albumin present may be obtained by boiling half a test-tubeful of urine, adding a drop or two dilute acetic acid and allowing it to stand for ten minutes to allow the deposit to settle. The height of the deposit is then read off in terms of the whole, as $\frac{1}{2}$ or $\frac{1}{4}$.

(b) **BY ESBACH'S ALBUMINOMETER.**—The principle of the method consists in measuring the depth of a coagulum produced by the

picric acid solution. The instrument consists of a thick glass test-tube marked from 0.1 up to 7.

Filter the urine, if not already clear, and if alkaline, render slightly acid with acetic acid. If the Sp. Gr. is 1.010 or more, dilute until the Sp. Gr. is 1.008. Fill the tube with urine up to the mark U, pour in reagent up to the mark R. Close the tube with a rubber stopper and invert a few times, to mix the fluids thoroughly. Allow to stand for 24 hours, then read off the level of the precipitate. The figures on the scale represent grammes of dried albumin per litre.

Divide by 10 to get the percentage, and multiply the result by 4.375 to obtain the amount of albumin in grains per ounce.

Note.—An excretion of 8 gm. of albumin daily represents an ordinary degree of albuminuria, i.e., about $\frac{1}{2}\%$.

Esbach's Solution

Dissolve 10 gm. Picric Acid and 20 gm Citric Acid, in about 900 c.c. of boiling distilled water, after cooling add water to 1 litre.

(c) HARROWER'S TEST.—This has the marked advantage that it can be completed in a few minutes; the usual picric acid test takes twenty-four hours.

Method of use.—Fill the albuminometer with reagent to mark R, add urine from a thoroughly mixed 24-hour sample until a faint white cloud appears and then take reading. The test is so delicate that urine is generally diluted to 1 in 10 or 1 in 3.

On the instrument there are two scales which give the figures in grammes of albumin per 100 c.c. for both of these dilutions.

It is a simple matter to use other dilutions, for instance, when using dilutions of 1 in 20 or 1 in 5, the reading on the scale intended for 1 in 10 dilution can be doubled or halved; for a dilution of 1 in 30 the scale intended for 1 in 3 can be used, the scale reading being then multiplied by 10.



Harrower's Albuminometer.

Harrower's Reagent

R. Phospho-tungstic acid	..	1.5 grammes
HCl (conc)	.	5 grammes
Absolute Alcohol		100 c.c.

QUALITATIVE EXAMINATION FOR SUGAR

(a) FEHLING'S TEST.—Fehling's solution does not keep for long after mixing; it should, therefore, be kept in two solutions (*see below*). Mix equal parts of No. 1 and No. 2 solutions in a test-tube, and in another take a quantity of urine equal to the mixture. Boil the contents of both test-tubes, and while boiling, pour the Fehling's solution into the urine. Benedict's solution is preferable.

If sugar is present, a reddish-yellow precipitate of sub-oxide of copper is rapidly produced.

Fallacies.—By reducing the specific gravity of the urine to 1.015 anomalous reactions may frequently be avoided.

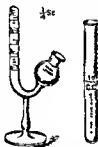
Chloroform, chloral, carbolic acid, salicylates, etc., and uric acid in concentrated urine, may reduce Fehling's solution.

In the first place, the urine must be free from albumin. If necessary, add a drop or two of acetic acid to the urine, boil and filter, and neutralize the filtrate with a little calcium carbonate.

This test cannot be applied to strongly ammoniacal urine. Pavy's modification should be employed.

(b) **FERMENTATION TEST.**—This is a very delicate, and an absolutely certain test for glucose. Alkaline urine must be acidified with tartaric acid to avoid putrefaction. The urine should be boiled, so as to drive out any air. Emulsify a small piece of German yeast in the urine before filling the tube with it.

Einhorn's saccharimeter consists of a U-shaped tube, the longer limb of which is closed and carries an empirical graduation, indicating the percentage of glucose corresponding to the amount of carbonic acid gas developed. Ten cubic centimetres of the urine, mixed with some yeast, are taken and the apparatus is filled with this mixture, care being taken to remove all air bubbles. After twenty-four hours' fermentation at room temperature, the percentage of glucose is read off.



Saccharimeter

Halliburton recommends, instead of fresh yeast, a more convenient commercial preparation called Zymine, a dry powder consisting of yeast which has been killed by acetone treatment and which retains the active enzyme (zymase).

QUANTITATIVE ESTIMATION OF SUGAR

(a) **LING AND RENDLE'S VOLUMETRIC METHOD.**—The urine is allowed to run from a burette into a known volume of boiling Fehling's solution. The end-point, i.e., the complete reduction of the cupric salt, is recognized by means of a solution of ferrous thiocyanate. When a drop of this indicator is placed on a slab and a drop of solution containing a cupric salt brought in contact with it, oxidation of the ferrous salt occurs, with the immediate production of the well-known red colour of ferric thiocyanate.

Preparation of the Indicator.—One gramme of ferrous ammonium sulphate and 1.5 grammes of ammonium thiocyanate are dissolved in 10 c.c. of water at a moderate temperature and immediately cooled; 2.5 c.c. of concentrated hydrochloric acid are then added. The solution so obtained has invariably a brownish-red colour, due to the presence of ferric salt, which latter must therefore be reduced. This is effected by shaking with a small quantity of zinc dust.

Preparation of Fehling's solution:—

Solution No. 1.—69·278 grammes of crystallized copper sulphate are dissolved in water, and the solution made up to 1 litre.

Solution No. 2.—346 grammes of crystallized potassium sodium tartrate (Rochelle Salt) are dissolved in hot water, mixed with 142 grammes of caustic soda, also dissolved in water, and after cooling made up to 1 litre.

Equal volumes of these two solutions are accurately measured out, and mixed in a dry flask before use. Ten cubic centimetres of the mixed solution are equivalent to 0·05 gramme of glucose.

Method.—Freshly mixed Fehling's solution (10 c.c.) is accurately measured into a 200 c.c. boiling flask, diluted with about an equal quantity of water, and raised to boiling point. The urine is diluted with water and placed in a burette; the dilution should be adjusted so that 20–30 c.c. of the diluted urine are required to reduce the 10 c.c. of Fehling's Solution. In the first experiment the urine should be diluted with nine times its volume of water. This diluted urine is then run into the boiling liquid in small amounts, commencing with 5 c.c. After each addition the mixture is boiled, the liquid being kept moving. About a dozen drops of the indicator are placed on a porcelain slab, and when it is judged that the precipitation of cuprous oxide is complete (that is, when the blue colour of the solution is disappearing), a drop of the liquid is withdrawn by a clean glass rod or by a capillary tube, and brought in contact with the middle of the drops of the indicator on the slab. The end-point is reached when the mixture ceases to give a red colour with a drop of the indicator. It is essential to perform the titration as rapidly as possible, as an atmosphere of steam is then kept in the neck of the flask and the influence of atmospheric oxygen avoided. At the final point the liquid is boiled for about ten seconds. As in all volumetric methods, the first titration may only give approximate results, and a second will then be necessary to establish accurately the end-point. Each titration should take from two to three minutes.

Example.—Suppose that the urine has been diluted tenfold with water, and that 20 c.c. of the diluted urine are found necessary to reduce the 10 c.c. of Fehling's solution; this will be equivalent to 2 c.c. of the original urine, and that amount will, therefore, contain

0·05 gramme of sugar; 1 c.c. will contain $\frac{0\cdot05}{2}$ and 100 c.c. will contain $\frac{0\cdot05}{2} \times 100 = 2\cdot5$ grammes of sugar.

PAVY'S MODIFICATION OF FEHLING'S SOLUTION is sometimes used. Here ammonia holds the cuprous oxide in solution, so that no precipitate forms on boiling Pavy's solution with a reducing sugar. The reduction is complete when the blue colour disappears. Ten cubic centimetres of Pavy's solution equals 1 c.c. of Fehling's solution, equals 0·005 gramme of glucose.

(b) A SIMPLE METHOD FOR DISPENSARY USE IS THAT OF DR. WALKER.—Boil 30 minims of Fehling's solution in a test-tube, and into it drop the urine minim by minim from a pipette, boiling after each drop, until the blue colour is discharged. Note the number of minims of urine consumed. Now refer to the special chart, and having found the corresponding figure below the chart, trace the vertical line upwards until it joins the curve; the figures found indicate percentage of sugar, and number of grains per ounce.

(c) BENEDICT'S QUANTITATIVE TEST.—This is a very useful method because the solution keeps indefinitely and the titration end-point is sharply defined.

Composition of Benedict's solution:

R	Crystallized Sodium Carbonate	..	..	200 grammes
	Potassium Citrate	..	..	200 grammes
	Potassium Sulphocyanide	..	..	125 grammes

Dissolve these three substances with the aid of heat in distilled water and make up to 800 c.c.

Purest air-dried crystalline copper sulphate 18 grammes (this weight must be accurate); dissolve in 100 c.c. distilled water and add to the first solution.

Add 5 c.c. of 5% solution of potassium ferrocyanide to the mixture, cool, and make up to 1 litre with distilled water.

Method.—Mix 10 c.c. of urine with 40 c.c. of distilled water and run from a burette into a boiling mixture of:

Benedict's solution 25 c.c.

Crystallized sodium carbonate.

10 grammes (approx.) powdered pumice.

A white precipitate forms, and the total disappearance of the blue colour marks the end-point.

Every 25 c.c. of reagent used indicates 50 mg. of glucose. The calculation is similar to that for Fehling's method.

QUANTITATIVE ESTIMATION OF UREA

(1) FROM THE SPECIFIC GRAVITY.—From this an approximate estimation of the percentage of urea can be obtained, by putting a decimal point between the last two figures, for example, if Sp. Gr. is 1.025, the urine contains 2.5% of urea.

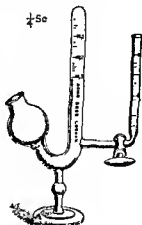
Note.—The value of this method is much diminished (a) in patients with high temperatures, (b) when the urine contains sugar or a high percentage of albumin.

(2) BY UREAMETER.—An instrument which indicates the amount of nitrogen given off, on treating urine with sodium hypobromite. This salt decomposes urea, liberating nitrogen. Under ordinary conditions of temperature and pressure, 1 gramme of urea yields 372 c.c. of nitrogen.

Hind's Modified Doremus' Ureameter with Side Tube for Urine

Directions for use.—The side tube and the lumen of the stop-cock are filled with the urine to be examined, which should, when possible, be taken from the collected excretion of 24 hours. The long tube of the apparatus having been washed out thoroughly with water, is then filled with the hypobromite solution up to the mark under the bulb. A reading is then made on the side tube, and 1 c.c. of the urine allowed to pass into the long tube by means of the stop-cock. After all the bubbles of gas have collected at the top of the tube and the froth subsides, the reading is taken. The graduations correspond to grammes in 1 c.c. of urine.

If the urine is concentrated, dilute with an equal volume of water. The result will then be equal to twice that indicated on the scale.



The percentage of urea is obtained by multiplying the result of the test by 100. *Example.*—Tube reading 0.02 = 2% of urea.

To ascertain the total amount of urea voided in twenty-four hours, multiply the result by the number of c.c. of urine passed during that period.

English Scale.—To convert above reading to grains per ounce multiply by 4.375. *Example.*—Reading 0.03, i.e., 3% of urea = $3 \times 4.375 = 13.125$ grains per ounce.

The composition of the hypobromite solution is as follows: Sodium hydroxide, 10 parts; distilled water, 25 parts; bromine, $2\frac{1}{2}$ parts. This solution keeps well for about a month, and may be easily prepared in a moment, freshly as wanted, by keeping a quantity of sodium hydroxide solution ready, and then adding the needful proportion of bromine. The latter should be kept in sealed glass capsules, each containing 2.5 c.c. of bromine, which may be dropped into 30 c.c. of the sodium hydroxide solution in a wide-mouthed stoppered bottle, and broken with a shake. In this way the disagreeable odour and inconvenience of handling the bromine are avoided. The same solution may be used for testing two specimens of urine.

MISCELLANEOUS TESTS**FOR ACETONE.**—

Legal's Test.—Add to the urine an equal quantity of 20% caustic potash solution and a few drops of a freshly prepared 1 in 10 solution of sodium nitroprusside. A red colour is produced. Acidify with strong acetic acid; the colour disappears at once in the absence of acetone, but remains or is intensified into a purple in its presence.

Rothera's Test.—Saturate the urine with crystals of ammonium sulphate and add a few crystals of sodium nitroprusside. Render

the solution alkaline with ammonia, and allow to stand. A deep purple colour develops in a few minutes if ketone bodies are present. Acetoacetic acid is detectable in a dilution of 1 to 500,000 by this test.

FOR ACETOACETIC ACID.—To 3 c.c. of the urine, add a few drops of 10% solution of ferric chloride as long as a precipitate (ferric phosphate) continues to be formed. Filter this off, and add to the filtrate a few more drops of ferric chloride solution. A claret colour, which disappears on beating, is developed in the presence of diacetic acid. A similar colour is produced by the urine of those who are taking salicylates. It does not disappear on heating, however.

FOR BILE PIGMENT.—

Shake the urine in a test-tube; if bile is present the froth is yellow.

Gmelin's Test.—Allow drops of urine and of fuming nitric acid to trickle together on a white porcelain dish. If bile pigment is present a play of colour results: green, blue, violet, red, yellow.

FOR BILE SALTS.—

Hay's Test.—Sprinkle powdered sulphur upon the surface of the urine which has cooled to room temperature. In the presence of bile salts it will sink.

FOR BLOOD.—

(1) **Spectroscopic Examination.**—Freshly passed urine, which, if deeply coloured, should be diluted with water, will exhibit the two absorption-bands of oxyhaemoglobin, which on the addition of ammonium sulphide, gives place to the absorption-band of reduced haemoglobin.

(2) **Heller's Test.**—Caustic potash is added to the urine and the mixture is boiled. The precipitate of earthy phosphates which falls carries down with it the haematin, formed by action of the alkali on the oxyhaemoglobin, and acquires a red colour.

(3) **Guaiacum Test.**—A mixture of equal parts of fresh tincture of guaiacum and mature oil of turpentine or ozonic ether is poured on to the surface of 10 c.c. of the urine. Blood is shown by the appearance at the junction of the fluids, of a ring, at first white and afterwards turning blue. The change is also produced by the urine of patients who are taking iodides.

(4) **Microscope.**—This reveals the presence of red corpuscles.

FOR PUS.—This is generally detected by physical examination; a white sediment always mixed with phosphates:

(1) Add Liq. Potassae to the deposit; pus gives a ropy gelatinous mass; this is distinctive—mucus is dissolved.

(2) Pus with tincture of guaiacum gives a green colour, which disappears on beating.

(3) **Microscope.**—Pus corpuscles are revealed; their nuclei are rendered evident by treatment with 1% acetic acid.

EHRlich's DIAZO REACTION.—Prepare two fresh solutions:

(1) A saturated solution of sulphanilic acid in 5% HCl.

(2) $\frac{1}{2}$ % solution of sodium nitrite.

To 5 c.c. of urine add an equal quantity of solution No. 1; then add a few drops of solution No. 2, and shake till frothy; add ammonia till alkaline.

A positive result is indicated if the liquid acquires a port-wine colour, and the froth at the same time is red. The reaction has significance in the following:

- (1) Except in very mild cases, the reaction is nearly always present in the second or third week of enteric fever.
- (2) In cases of rapidly advancing tuberculosis the reaction is very constant.
- (3) The reaction is usually present in measles, and absent in German measles.

MICROSCOPICAL EXAMINATION OF THE URINE

Cellular constituents and organized sediments in the urine:

- I. Red blood corpuscles.
- II. Leucocytes.
- III. Epithelium.
- IV. CASTS.—These may be divided into two chief classes, (i) unorganized and (ii) organized.
 - (a) UNORGANIZED CASTS are composed of crystals and are of little pathological consequence.
 - (b) ORGANIZED CASTS consist of cellular elements or of products derived from these and may be subdivided into three groups:
 - (1) Those which consist of cellular elements—red blood corpuscles, leucocytes, and epithelial cells.
This group includes:
 - (a) Casts composed of red blood corpuscles.
 - (b) Casts composed of leucocytes.
 - (c) Epithelial casts.
 - (d) Casts consisting of colonies of bacteria.

Note.—The clinical importance of the first group is very great. They always imply an affection of the kidney, and their presence alone suffices to establish the existence of nephritis.

- (2) Those which consist of metamorphosed cellular elements.

This group includes:

- (a) GRANULAR CASTS.—In considerable numbers these indicate nephritis. They are produced by degeneration of blood and epithelial casts.
- (b) WAXY CASTS.—These are not characteristic of any special disease; they are found in acute and chronic nephritis with contracted granular and amyloid kidney. Their mode of origin is still an open question.

(c) **FATTY CASTS.**—These are most commonly associated with subacute and chronic nephritis, of a protracted course, with tendency to fatty degeneration of the renal tissue.

(3) The so-called hyaline casts.

This group includes:

HYALINE CASTS.—These may be divided into such as are simply hyaline, and such as have surface coatings of various kinds, such as renal epithelium, red and white blood corpuscles, bacteria and crystals. Pathological significance varies with the elements adherent to them.

V. Spermatozoa.

VI. Fragments of tumours.

VII. Parasites:

(1) Fungi;

(2) Infusoria;

(3) Vermes:

(a) Ova of *Distoma haematobium*.

(b) *Filaria Sanguinis hominis*.

(c) Hooklets and fragments of the cysts of *Echinococcus*.

(d) Ova of *Bilharzia*.

CHEMICAL SEDIMENTS IN URINE

In Acid Urine

URIC ACID.—Whetstone, dumb-bell, or sheaf-like aggregations of crystals deeply tinged by pigment.

URATES.—Generally amorphous. The primary urate of sodium and of ammonium may sometimes occur in star-shaped clusters of needles or spheroidal clumps, with projecting spines. Tinged brick-red. Soluble on warming.

CALCIUM OXALATE.—Octahedral, so-called envelope crystals. Insoluble in acetic acid.

CYSTINE.—Hexagonal plates; rare.

LEUCINE AND TYROSINE.—Rare.

CALCIUM PHOSPHATE.—Rare.

In Alkaline Urine

PHOSPHATES.—

Calcium Phosphate.—Amorphous.

Triple Phosphates.—Coffin lids or feathery stars.

Calcium Hydrogen Phosphate.—Rosettes, spherules or dumb-bells.

Magnesium Phosphate.—Long plates.

All soluble in acetic acid without effervescence.

CALCIUM CARBONATE.—Biscuit-shaped crystals. Soluble in acetic acid with effervescence.

AMMONIUM URATE.—"Thorn-apple" spherules.

LEUCINE AND TYROSINE.—Very rare.

SOLUTIONS REQUIRED FOR URINARY TESTING

STANAOARO NITRATE OF SILVER SOLUTION.—Dissolve 29.063 gm. of pure fused silver nitrate in distilled water, and fill up to 1 litre. Keep in the dark.

HYPOBROMITE SOLUTION.—Dissolve 100 gm. of caustic soda in 250 c.c. of water, cool, then add 25 c.c. of bromine. The solution is apt to undergo the following decomposition:—



It is, therefore, better to prepare it as required, by adding 2.5 c.c. of bromine to 25 c.c. of the caustic soda solution.

The bromine is supplied in small tubes, which readily break when shaken up smartly with the caustic soda solution in a stout stoppered bottle.

ESBACH'S REAGENT—See Examination of Urine, p. 479.

FEHLING'S SOLUTION—See Examination of Urine, p. 481.

PAVY'S SOLUTION.

Cupric Sulphate	4.158 gm or 36½ gr.
Rochelle Salt	20.4 gm or 178 gr.
Caustic Potash	20.4 gm. or 178 gr.
Strong Ammonia (Sp. Gr. 0.880)	300 c.c. or 6 oz.
Water to	1 litre or 1 pint

Dissolve the Rochelle salt and caustic potash in part of the water and the sulphate of copper in another part (with the aid of heat); pour the copper solution into that of the alkali and Rochelle salt, cool and add the ammonia, then fill up to a litre.

Keeps indefinitely. 10 c.c. = 5 mg glucose.

PEPTONE SOLUTION FOR TESTING FOR BILE ACIDS—

Powdered Peptone (Savory and Moore's)	3 ss
Salicylic Acid	gr. 4
Acetic Acid	3 ss
Distilled water to	3 viii

Filter repeatedly until transparent

POISONS.—

A large number of poisons can be detected in the urine; among the inorganic poisons the chief are arsenic, lead, antimony and mercury. Of the vegetable poisons and alkaloids the chief are cocaine, the belladonna group, aconite, santalin, etc.—strychnine is rapidly eliminated.

PARASITIC AND BACTERIAL INFECTIONS.—

The ova of *Schistosoma* may occur with profuse haematuria. The following bacteria may be found in the urine in different suppurative conditions of the genito-urinary tract and in septicaemia and prolonged pyrexia: *B. typhosus*, *B. paratyphosus*, *B. melitensis*, *B. coli*, *B. tuberculosis*, streptococci, staphylococci, gonococci.

RENAL EFFICIENCY TESTS.—

Volume and Specific Gravity Test.—If the amount of urine excreted in 24 hours is within normal limits, that is between 40 and 60 ounces or 1 and 1½ litres, if the specific gravity is between 1.015 and 1.025 and if there are no pathological substances there is probably nothing wrong with the kidneys. In hot weather the amount is diminished and the specific gravity raised. In the absence of sugar, a very rough estimate of the urea percentage can be formed

by putting a decimal point between the last two figures of the specific gravity, e.g., $1.023 = 2.3\%$ urea roughly.

Maclean's Urea Concentration Test.—This is one of the simplest and most valuable tests of renal efficiency. It is carried out as follows:

- (a) The patient takes no fluid and is kept comfortably warm for three hours.
- (b) He empties his bladder.
- (c) He drinks a fresh solution of 15 grammes ($\frac{1}{2}$ ounce) of urea in 120 c.c. (4 ounces) of water.
- (d) He passes urine 1, 2 and 3 hours after drinking the urea solution, and the urea content of each sample is estimated separately; if the amount is less than 2% there is renal insufficiency. With healthy kidneys the urea in the second sample should be in the neighbourhood of 3%.

For method of estimating urea see page 482.

BLOOD-UREA.—The normal quantity is between 15 and 40 milligrams per 100 c.c. and the test is a somewhat complicated affair for which a well-equipped laboratory is required. Its greatest value is perhaps when it is done in conjunction with the urea concentration test, the blood sample being taken just before the second specimen of urine is passed.

Volhard's Water Elimination Test.—This is valuable in a cool climate but not if the patient is sweating; it is carried out as follows:

- (a) No fluid is given for 12 hours and the early morning specimen of urine is collected: the specific gravity should be between 1.020 and 1.025.
- (b) Give $1\frac{1}{2}$ pints (1 litre) of water and collect hourly specimens of urine for four hours.
 - (i) The whole amount drunk should be excreted in 4 hours.
 - (ii) The specific gravity should be much lower (1.002–1.010) than that of the overnight specimen.

Renal insufficiency is indicated when only part of the fluid is excreted and when the specific gravity is about the same before and after the administration of fluid.

A refinement is to estimate the percentage of urea in the various specimens.

The advantages of the test are its simplicity, its value, and the fact that no urea need be given to the patient.

The Indigo Carmine Test.—This is used for estimating the relative efficiency of each kidney, but is largely superseded by pyclography. It is carried out as follows:

- (a) Anaesthetize the patient's urethra by injecting into it 3 c.c. of a 1% solution of Anethaine or Pantocaine and letting the patient empty his bladder after 10 minutes.
- (b) Pass a cystoscope and fill the bladder with sufficient warm normal saline to ensure a good view.

- (c) Give intravenously 2 c.c. of a 0.4% solution of indigo carmine (i.e., 8 mg. or $\frac{1}{4}$ grain indigo carmine in 2 c.c. water).
- (d) Watch the ureters for the first appearance of blue urine: this should appear within five minutes.

EXAMINATION OF FAECES (*see also* Dysentery.)

It is important to remember that a negative opinion should not be given on one examination, but at least two or three should be made.

(1) THE NAKED-EYE APPEARANCE.—Colour often has a pathological significance, e.g., the colourless watery stool of cholera; the grey-white of membranous colitis due to large amounts of mucus or pus; clay-coloured from excess of fat in obstructive jaundice or pancreatic deficiency or the large frothy stools of sprue; black from the administration of purgatives, bismuth salts and iron—apart from these drugs black stools probably indicate bleeding in the upper part of the alimentary tract, which may be due to ulcer, carcinoma or ruptured varicose veins at the cardiac orifice. Repeated examination should be made for occult blood.

Red.—Due to considerable hæmorrhage in the large intestine and rectum.

Green.—This may be due to mercury or colchicum. In infantile diarrhoea it is due to biliverdin from abnormal decomposition. In typhoid it may point to ulceration of the large intestine.

Yellow.—Apart from drugs such as santonin, senna and rhubarb, it may be due to unaltered bile hurried rapidly through the intestine by increased peristalsis.

Mucus.—If present in quantity points to an irritated and inflamed large intestine. A small motion with much mucus points to chronic intestinal obstruction.

Blood.—When black (*melaena*) the origin is the stomach or duodenum. This is also the case if brownish in colour and large in amount. If a liquid motion is evenly mixed with blood it probably comes from the large intestine. If on the surface of the motion it is probably from the rectum and is due to piles.

Pus.—This is not usually seen unless there has been rupture of an abscess.

Parasites.—The following may be recognized: tapeworms, roundworms and threadworms.

(2) MICROSCOPICAL EXAMINATION.—This is often useful to confirm macroscopic findings. In examination for parasites and ova, the specimen must be fresh and for *Entamoeba histolytica* should be kept warm; the organism may be present without symptoms of dysentery, and every case with symptoms of liver abscess should be examined for amoebae and cysts. *Amoebae coli* are non-pathogenic. Pathogenic bacteria are identified by culture; if tubercle bacilli are found, and the source is not swallowed sputum, and milk can be excluded, they probably come from tuberculous enteritis.

EXAMINATION FOR OCCULT BLOOD.—Blood originating from the

lower part of the alimentary tract may be found by microscopical examination. Blood originating from the upper part may be found by the following test, but the patient should not have red meat for 24 hours before the collection of the stool for testing:

- (a) Take $\frac{1}{2}$ c.c. stool in 2 c.c. distilled water and boil.
- (b) Make a fresh saturated solution of benzdine in glacial acetic acid.
- (c) Hydrogen peroxide (10 vols.).

For the test, mix three drops of (a), ten of (b), and twenty of (c). A blue colour quickly develops if occult blood is present.

POISONS.—The following poisons are eliminated by the bowel: arsenic, lead, copper, phosphorus, picric acid, ergot, etc.

LIVER EFFICIENCY

(1) **RECOGNITION OF JAUNDICE; VAN DEN BERGH'S REACTION.**—The excess of bilirubin in the blood can be recognized by a colour reaction given by Ehrlich's diazo reagent. It is possible to distinguish between three forms of jaundice:

- (a) **OBSTRUCTIVE JAUNDICE.**—An immediate direct reaction is obtained, the maximal colour intensity appearing within 10–30 seconds, the depth depending upon the amount of bilirubin present.
- (b) **HAEMOLYTIC JAUNDICE.**—In these cases if serum and reagent are mixed a negative or greatly delayed reaction occurs (1–15 minutes). This is confirmed by the indirect reaction, which is performed by treating the serum with alcohol and centrifugalizing; the bilirubin dissolves in the alcohol to which the reagent is added; a blue colour is produced which slowly deepens.
- (c) **TOXIC AND INFECTIVE JAUNDICE.**—A biphasic reaction generally occurs in these conditions, on mixing serum and reagent; a faint red colour appears immediately, slowly becoming violet.

(2) **LAEVULOSE TOLERANCE CURVE.**—The storage of sugar as glycogen is one of the most important functions of the liver. To a patient who has fasted from 8 p.m. 50 gm. of laevulose in 100 c.c. of water are given at 8 a.m. Blood-sugar tests are made at 8.30, 9, 9.30, 10 and 10.30. With normal metabolism the blood-sugar curve should rise very little above 0.1%.

There are several other methods of testing liver efficiency, such as direct examination of the gall-bladder contents, blood-cholesterol content, and testing another important function of the liver, namely, to neutralize toxins.

PANCREATIC EFFICIENCY

For the pancreas to deal effectively with the metabolism of carbohydrates it depends as much upon its internal secretion insulin, which can be accurately estimated by the glucose tolerance curve, as on the external secretion passed into the intestines. There are a number of methods for estimating the efficiency of the latter, e.g., the sugar tolerance test. (*See above.*)

LACTATION—See *Obstetrics*.

LARYNX (See also *Air Passages and Oesophagus—Foreign bodies in.*)

THE LARYNGOSCOPE.—Considerable practice is needed for the intelligent use of the laryngoscope, and every opportunity should be taken to gain experience.

Method.—

- (a) Many patients can tolerate a laryngoscope mirror without a local anaesthetic, but if there is any tendency to "gag", the back of the pharynx should be sprayed or swabbed two or three times at three-minute intervals with 5% cocaine or 1% Anethaine.
- (b) Adjust the head-mirror or head-light (the latter is easier to use), tell the patient to open his mouth, and make sure that the light is right.
- (c) Take a gauze swab, put it on the patient's lower lip and tell him to put out his tongue over it. Wrap the tongue in the gauze and draw it as far out of the mouth as it will come comfortably.
- (d) Warm the laryngeal mirror in a spirit flame, test it on the back of your hand and insert it in the patient's mouth so that it touches the posterior pharyngeal wall. (Beginners generally have it too far forward.)
- (e) Tell the patient to say "Ah" then "E" and watch the movements and condition of the vocal cords and of the surrounding structures (see Fig. 26).

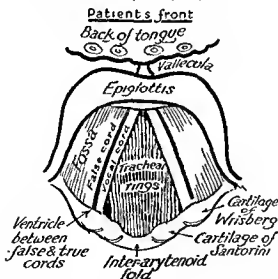


Fig. 26—Laryngoscopic view.

Normally the vocal cords stand out as pearly-white structures, which move freely and symmetrically.

Acute Laryngitis.—The cords are red, the fossae swollen and there may be flakes of mucus about.

Diphtheritic Laryngitis.—This is usually accompanied by considerable swelling, the greyish membrane being on the false cords.

Chronic Laryngitis.—The cords are reddish.

Fibroma of a Cord.—This is seen as a small nodule.

"Clergyman's Sore Throat".—This shows as two small nodules opposite to each other.

Tuberculosis often begins in the inter-arytenoid fold, whereas *syphilis* more commonly begins at the anterior end of the vocal cords. These generalizations are not invariable and either disease can severely damage or destroy the larynx. Tuberculous cases have tubercle bacilli in the sputum and often lesions in the lungs, whereas syphilitic cases have a positive blood test.

Carcinoma.—This may affect one or other cord, "intrinsic", or spread beyond the larynx, "extrinsic".

Paralysis.—This may affect one or both cords owing to local conditions such as aneurysm, growth or injury, or may occur in diseases of the nervous system.

Finally, the irritative cough that frequently follows influenza or other respiratory diseases is often due to catarrh of the inter-arytenoid fold of mucous membrane.

TREATMENT.—

Acute Laryngitis.—This is best treated by chemotherapy coupled with soothing inhalations such as the vapour of Friars' balsam (a teaspoonful poured on to very hot water in a basin, the patient covering his head with a towel and inhaling the steam and vapour). A better system is to use a Nelson's inhaler. Insufflation with penicillin-sulphathiazole powder is also widely used.

Chronic Laryngitis.—The patient must not use his voice. The cause is treated when possible, and inhalations are given as above.

Tuberculous Laryngitis.—If there is pulmonary tuberculosis as well, a striking improvement in the larynx may follow successful treatment, such as artificial pneumothorax of the lung.

Where a Burney-Yeo inhaler is used a favourite prescription is the following:

R. Menthol.	..	..	..	..	gr 15
Guaiacol.	..	..	..	..	5j
Chloroform.	..	..	..	..	5j
Ol. Pini Sylv.	..	..	..	..	℥ 30
Ol. Eucalypti	..	..	..	..	℥ 30
Spirit. Vin Rect. ad	..	..	..	..	5j

Growths.—These can be removed by diathermy, and malignant growths are treated by radium or X-rays, but these methods are for the specialist.

TRACHEOTOMY.—This is required for the relief of obstruction or sometimes as a preliminary to operation. In cases of obstruction do not wait too long; the indrawing of the intercostal spaces at each inspiration is a definite indication for immediate tracheotomy.

The operation should not be hurried; the head and neck are often congested owing to asphyxia, and if a panic-stricken slash is made into the trachea the patient is far more likely to lose his life through inhaling blood than to gain it through free respiration. Haemostasis must be complete before the trachea is opened.

Anaesthetic.—An unconscious patient needs no anaesthetic. Local anaesthesia by means of about 5 c.c. of Novocain with $\frac{1}{2}$ c.c. of adrenaline is adequate for most other cases. General anaesthesia is usually dangerous because of its effect on respiration, but may be required for a child. Gas and oxygen, or ethyl chloride are the least dangerous. In cases in which there is a suitable vein, Cyclonal or Pentothal Sodium may be used. It is better to perform a painful operation than to lose the patient's life through misplaced kindness.

Method.—The following are required: Knife, scissors, two dissecting forceps, six artery clips, two retractors, tracheal dilating forceps (Bowlby's), outer and inner tracheotomy tubes, catgut, silkworm gut, needles, swabs, and an electric torch. This last is most necessary for quickly finding bleeding points and landmarks, and in case the lights fail, as they did in Quetta on one occasion when the writer had to complete the operation in the dark.

After the patient's skin has been painted with iodine and the anaesthetic injected or administered:

- (a) Put a sand-bag or pillow behind the patient's shoulders so as to extend the neck fully. Whenever possible the head end of the table should be well raised (reversed Trendelenburg position)—this diminishes bleeding.
- (b) Holding the patient's cricoid cartilage firmly between the left thumb and forefinger make a vertical incision at least one and a half inches long exactly in the midline just below the cricoid.
- (c) As soon as the skin and subcutaneous fascia are incised the assistant catches all bleeding points and widely retracts the edges of the wound. If the isthmus of the thyroid gland is seen in front of the trachea (usually rings 2-4) it can be drawn downwards, otherwise it is cut across and each side caught in a haemostat. A good many veins are encountered and the pre-tracheal fascia obscures the view of the trachea. A simple method of exposing the trachea is to make a small transverse incision down to the cartilage of the lower end of the cricoid; through the hole thus made in the fascia, thrust the blades of a pair of scissors and open them out; replace them by one blade of an artery forceps and close the forceps. Insert another artery forceps in the same way alongside the first and close it. Then cut between the forceps and the trachea is exposed cleanly and bloodlessly (Digby, quoted by Hamilton Bailey).
- (d) With the edge pointing forwards thrust the point of the knife into the trachea and incise about three rings.
- (e) Turn the knife blade through ninety degrees; this opens the trachea. Before removing the knife insert Bowlby's tracheal

dilating forceps and open them, so as to facilitate insertion of the tube, or compressing the two blades together, insert the outer component of the tracheotomy tube, wrap some sulphathiazole gauze round it where it enters the wound, and tie the tapes.

- (f) Replace artery clips by ligatures, powder the wound with sulpbathiazole and sew up as much as necessary; apply dressings and insert the inner component of the tracheotomy tube.

The air inhaled through a tracheotomy opening is not warmed or moistened by passage through the upper respiratory passages, so great care must be taken to keep the air warm and moist for the first week or two after the operation.

If the patient shows signs of dyspnoea it is generally due to mucus or blood in the tube, which must be taken out and cleaned; in any case the inner tube must be cleaned once or twice daily. If the tracheotomy is to be permanent some patients find a rubber tube more comfortable than a silver one.

LEAD POISONING—See Plumbism.

LEECHING

Leeching is used for the abstraction of blood from congested parts inaccessible to wet cupping.

There are two varieties of natural leeches, their capacity varying from 3j to 3iv (4–16 c.c.). The artificial leech consists of a small cupping apparatus and a scarifier. With this about an ounce of blood can be withdrawn.

The number of leeches applied at one time should be from 1–6.

The site of the leeching should be shaved and well washed with soap and water. The leech is applied to the part in an inverted test-tube. If it refuses to take hold, the skin may be punctured or rubbed with a little sweetened milk. Once the leech has taken hold, it should not be disturbed until it is full, when it will drop off; sprinkling with salt will make it let go.

When the leech has dropped off, more blood may be removed by applying a hot fomentation. The bite is finally cleaned with sterile water and a gauze dressing applied; if the bleeding is still troublesome, a little alum or a compress of adrenaline hydrochloride, with pressure, will stop it.

Leeches should not be applied to parts with much loose connective tissues, such as the scrotum, labia, penis and eyelids; otherwise, extensive ecchymosis may result. They should not be applied directly to an inflamed surface, as their bite is irritating.

LEISHMANIASIS

Kala-Azar is caused by infection with *Leishmania donovani* from a sand-fly bite, *Phlebotomus argentipes* being the vector in India, where the disease is endemic in the Ganges and Brahmaputra valleys and deltas; indeed, except for two small areas in Madras, it is practically confined to these areas.

"The sand-flies are found in the largest numbers in cattle shed well protected from wind currents. They are also found in the ground-floor rooms of houses, when these are damp and ill-ventilated and have a broken or unpaved floor, and especially in rooms with a window opening on to a courtyard where ducks, chickens or goats are kept. In the rural areas they can be found in almost any hut, but they prefer those with thick mud walls, which continually draw up moisture from the ground; they can find comparatively cool humid conditions at almost any time of the year." (Napier—*Principles and Practice of Tropical Medicine*.)

From this description the reader will be able to deduce how to prevent and how to avoid infection with kala-azar.

INCUBATION PERIOD.—The incubation period is not certain but is probably between two and four months. Some years ago the writer saw a fully-developed case in London; the patient had left Bengal twelve months before and "so far as he knew had had fever for about four months".

DIAGNOSIS.—Apart from the history, the enlarged spleen and liver and the presence of anaemia, the best clue is perhaps the *biphasic temperature curve*, the temperature generally being high in the middle of the day, falling in the afternoon and rising again at night, only to fall by the next morning.

In most cases splenic puncture shows the parasites, sometimes in enormous numbers. If the disease is suspected, but the spleen is not enlarged, sternal puncture should be carried out. The former is done with a fine hypodermic needle and syringe, just below the tip of the last rib, and over an area where the spleen is dull to percussion: sternal puncture can be done with a lumbar-puncture needle to one or other side of the middle line. In both procedures local anaesthesia is required for the skin and subcutaneous tissues. Splenic puncture should be carried out gently but quickly, with the patient holding his breath, otherwise there is danger of tearing the spleen. (It is not necessary to suck the blood actually into the syringe.)

TREATMENT.—Low and Sen Gupta, in a personal communication, sum up as follows:

"(1) In Indian kala-azar, the pentavalent antimonials are excellent in the vast majority of cases. These include several drugs sold under proprietary names—Urea Stibamine, Aminostiburea, Stiburea, etc. The dose for an adult is 2.7 to 3 gm. Neostibosan (Bayer) was excellent but is no longer available and there appears to be no equivalent.

(2) Diamidinostilbene (stilbamidine) is definitely inferior to pentamidine. The trade name of the latter is Pentamidine (M. & B. 800).

(3) The following other drugs are of value in kala-azar:

(i) Stilbamidine (M. & B. 744). This drug is not recommended for routine use in kala-azar. It is rather toxic and in a

considerable proportion of cases its use is followed by the appearance of sensory changes in the face caused by damage in the neighbourhood of the fifth-nerve nucleus. Its use is justified in three types of cases: (a) those not responding properly to antimony in full doses; (b) those showing hyper-sensitiveness to antimony; and (c) in patients with both kala-azar and pulmonary tuberculosis. Stilbamidine is definitely contra-indicated in cases showing severe jaundice, haemorrhages or nephritis.

(ii) Stibatin is the British equivalent of Solustibosan (Bayer). It is a fairly satisfactory drug and has the advantage that it can be given intramuscularly. This is very useful in young children. The immediate cure rate of kala-azar with Stibatin is high but the relapse rate is of the order of 12-15%."

(iii) If the above are not available, give intravenous tartar emetic, $\frac{1}{2}$ grain in 2 c.c. of sterile water, daily. Begin with $\frac{1}{2}$ grain, and increase by that amount up to 2 or $2\frac{1}{2}$ grains per dose. The course is 20-30 injections, about 40-60 grains in all.

CUTANEOUS LEISHMANIASIS (Tropical Sore).—This is caused by *Leishmania tropica*, which is serologically distinguishable from that causing kala-azar, and transmitted by different vectors, namely, *Phlebotomus papatasi* and *P. sergenti*, which differ from *P. argentipes* in their taste for the dry, sandy earth of Baluchistan and the frontier.

DIAGNOSIS.—Tropical ulcer should be suspected if a person in or from an endemic area has an indolent, painless ulcer on an exposed part of the body where the skin is thin. A scraping should be taken, stained with Leishman or Giemsa stain, and examined, when the typical *Leishmania tropica* bodies will be seen.

TREATMENT.—After many years in Baluchistan the writer came to the conclusion that a thorough scraping with a sharp spoon under quick general anaesthesia such as gas, ethyl chloride, Pentothal or Cyclonal Sodium gave the quickest and the best results. Vaseline or Cibazol ointment on gauze, followed after a few days by Elastoplast forms an excellent dressing, and the ulcer, if not more than half an inch in diameter, is healed in a fortnight.

The earlier the treatment is begun the greater the success and the smaller the scar.

In very early cases CO₂ snow may cure the condition or it may be possible to excise the ulcer completely and sew up the incision.

If the ulcers are multiple (after the Quetta earthquake some patients had hundreds) intravenous antimony should be given as for kala-azar, but the new diamidine drugs are apparently without effect.

LEPROSY

INFECTIVITY.—The opinion of the Central Advisory Board Committee is as follows:

- (i) A child born of an infective parent and removed at birth practically never develops leprosy.
- (ii) Children so born but not separated from the infective parent develop leprosy in a high proportion of cases (up to 80%) although it may be years before the disease shows itself.
- (iii) An adult similarly exposed to infection, e.g., the wife or husband, develops the disease comparatively rarely (5-10%).
- (iv) Close continued contact is the most dangerous.
- (v) It appears that casual contact rarely transmits the disease in adults but may commonly do so in children.
- (vi) In India it seems probable that 70-80% of lepers are non-infective but there are great regional variations. Muir states that "In adults, severe or prolonged debility frequently changes a mild or latent infection into a virulent and rapidly progressive form."

Practically all cases of leprosy are acquired from patients with the cutaneous variety, in whom also the nasal discharge often teems with *lepra bacilli*.

If repeated skin clippings and nasal swabs are negative for *lepra bacilli*, a case can be considered non-infective.

TREATMENT.—In addition to special treatment with hydno-carpus (*chaulmoogra*) oil, or, indeed, before this is begun, it is essential to treat any other disease that may be present, such as malaria, chronic dysentery or hookworm disease, and to improve the patient's general health by means of fresh air, good fresh food and reasonable exercise.

Obviously, both the special and the general treatment can be carried out best, or at any rate begun, in an institution (*see list below*) and this should be advised *in every case*, for the following reasons:

The patient has the benefit of treatment by experts.

Laboratory tests can be carried out, often a great help in treatment.

Concurrent diseases receive proper and thorough treatment.

Special food, good sleeping quarters, fresh air and carefully graduated exercises are all provided.

The patient is taught how to look after himself after his return home, what to eat, what to do and what not to do. Last, but not least, he enters a hopeful atmosphere and has the invaluable and recurring stimulus of seeing other patients being discharged cured.

If no institution is near enough for use by the ordinary people, and if there are several or many cases of leprosy in a town or village, the doctor is very strongly advised to attend a course of instruction at a recognized institution and to set up his own leprosy clinic on his return; by doing this he will probably earn more gratitude than money, but it is for him to decide which he prefers. In India, a doctor who is loved by the poor can always have a good practice among the rich.

Unfortunately at the present time there is only about one institutional bed for every hundred lepers.

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Unfortunately at the present time there is only about one institutional bed for every hundred lepers.

Province	Name of the Clinic or Institution		Address
Central Provinces	Lepet Home		Rajnandgaon.
	Raipur Lepet Asylum		Raipur.
		<i>Name of the Clinic.</i>	
	Dharsiwa Clinic.	Drug	Clinic.
	Kharora	Balod	"
	Bhilai	Bhatspara	"
	Gurur	Balodabazar	"
	Simga	Champa	"
	Pamgarh	Horsu	"
	Nawagarh	Anjangaon	"
	Mustun	Akot	"
	Sheoringrayan	Burhanpur	"
	Pathana	Shahapur	"
	Kurud	Pandhana	"
	Hurn	Sausar	"
	Jajapur	Khandwa	"
	Palari	Pariwara Clinic in Berar.	
	Arang	One Clinic near Betul.	
	Arjuna		
Central India	Henderson Memorial Lepet Home.		Dhar.
	Indore King Edward Hospital Leprosy Clinic.		Indore.
	Sehore Lepet Asylum		Sehore.
Hyderabad (Nizam's)	Dichpali Lepet Home and Hospital.		Dichpali.
	Leprosy Clinic		Narayanpet.
	"	"	Kalwakurti.
	"	"	Makthal.
	"	"	Gulburga.
	"	"	Nander.
	"	"	Parbhani.
	"	"	Aurangabad.
	"	"	Karimnagar.
	"	"	Bhur.
	Bidar Leprosy Clinic		Bidar.
	Leprosy Clinic		Osmanabad.
	"	"	Nizamabad.
	"	"	Armoor.
	"	"	Yellareddi.
	"	"	Bodhan.
	"	"	Kamareddy.
	"	"	Banswara.
	"	"	Raichur.
	"	"	Gurgawati.
	"	"	Hanankunda.
	"	"	Katarmundh.
	"	"	Dharamsala.
	"	"	Shahpur.
	"	"	Kangra.
	"	"	Nagrota.
	"	"	Thuri.
	"	"	Paprola.
	"	"	Jogindarnagar.
	"	"	Sujanpur.
	"	"	Kula.
	"	"	Naggar.
	"	"	Jari.
	"	"	Baryar.

temperature of 125°-135° C. Such a temperature insures instantaneous sterilization.

Though various forms of injection (intramuscular, subcutaneous, intravenous and intradermal) have now taken precedence of the older methods of inunction and oral administration, the latter are still often used as supplementary methods.

INTRADERMAL INFILTRATION.—This method undoubtedly gives better results than intramuscular and subcutaneous injections; it is not difficult for any leprosy worker to satisfy himself on this point by treating some of a patient's lesions by intradermal infiltration and leaving others to serve as a control. In patients in whom the skin areas involved are too small to permit giving the desired doses by the intradermal route alone, supplementary intramuscular or subcutaneous injections may be given.

Objections have been raised that, as leprosy is a general disease, infiltration of skin lesions will not affect the disease as a whole, especially in the internal organs, but there is reason to believe that the benefit of these injections is not confined to the lesions infiltrated.

For intradermal infiltration either the pure oil or the esters may be used, with the addition of 4% of creosote. The oil is more slowly absorbed, but in patients with extensive lesions it may take several months before the whole affected area of the skin can be infiltrated, and prolonged retention of the drug in the lesion may increase the local effect.

The viscosity of the oil may also be lessened by heating it on a water bath to 55° C. The greater difficulty of injecting is still further overcome by using a short guarded needle. The oil is necessarily much cheaper than the esters, and it is easier to insure uniform quality. The *H. wightiana* oil obtainable in India, with 4% of creosote added, causes on the whole no more irritation than the creosoted esters.

Technique of Intradermal Injection.—A small syringe is used and, except for reaching the deeper lesions, a short guarded needle is convenient, as it controls the depth of puncture. The quantity of drug to be injected is drawn up or poured into the syringe; if oil is used, its temperature must be at least 55° C. The area to be injected is marked off with a grease pencil and sterilized with spirit or iodine. Infiltration is made through multiple punctures, 6-10 mm. apart. From 0.05-0.1 c.c. is injected at each puncture, so that in order to give the maximal dose of 6 c.c. some 60-120 punctures are required. If a large area has to be covered, the punctures may be spaced more widely. The needle should be sloped to an acute angle with the skin surface, and should not enter to a depth greater than 2-3 mm., except in the case of deeper lesions.

In patients with marked fibrous nodules it is sometimes well to begin treatment by infiltrating these first, the more diffuse lesions being treated later. With an ordinary hypodermic needle 2-4 drops of the drug are slowly injected into the middle of the nodule, which

first will swell and later shrink, with or without liquefaction and discharge.

Dose.—The dose will vary according to the tolerance of the patient, from 0.5–5 c.c. being given once or twice a week. In active patients in good condition the larger doses are tolerated, but, as has been said, it is well to begin with the small doses and gradually work up. Pain and ulceration may result if too much is injected at one point, if the injection is too superficial or if the drug is unduly irritating.

Almost all skin areas showing either visible lesions or deep analgesia, due to local invasion by *B. leprae*, are suitable for treatment by this method, but secondary neural lesions should be avoided. Since lesions may be present without outward signs, one should not necessarily consider the absence of a visible lesion as a contra-indication for infiltration if analgesia is present.

When lesions are widespread it is often well to begin with the back of the trunk, as the skin is less sensitive and the process of injection cannot be seen by the patient; the face and other more sensitive regions may be treated when the patient has become accustomed to the injections. A record of treatment may be charted to ensure systematic covering of all areas affected.

As a rule, at least one month should elapse before any lesion is re-infiltrated, so as to give time for the induration caused by the previous injection completely to disappear; otherwise considerable pain and even ulceration may occur. Spots of hyper-pigmentation remain at the old sites of puncture, and the new punctures should be made between these. Analgesia is generally less in areas already infiltrated, so that more pain is felt on each successive occasion. As a rule, however, patients are willing to suffer pain when they see definite improvement. With patients showing high general resistance and few lesions it may be sufficient to infiltrate all the lesions at one or two sittings and not repeat treatment for a month.

Intramuscular and Subcutaneous Methods.—In some cases intradermal injections may be found impracticable, and in these the intramuscular and subcutaneous methods may be used. For intramuscular injection the gluteal region is the site of choice. Injections are given deep into the muscles, carefully avoiding the bone and the sciatic nerve. The patient preferably should be seated on a stool. The dose should be divided into several portions, the needle being partly withdrawn and re-inserted at a different angle after each portion is injected. Similar injections may be given subcutaneously in divided doses, not more than one cubic centimetre being injected at any one point. Deep massage should be applied after injection in order to facilitate absorption.

The usual dosage is 0.5 c.c. rising to 6 c.c. and given once or twice a week, according to tolerance.

Supplementary Treatment.—Absorption of leproma can be promoted by various applications to the skin, such as rubbing with chaulmoogra or other kinds of oil, hot baths, and the application

of caustics—CO₂ snow is useful for application to nodules. For macules or diffuse lesions painting with a solution of trichloroacetic acid is at least as effective and much easier to apply, and its effects are easier to control. A 1 in 3 solution in distilled water is painted on one or more of the macules or, when the disease is diffuse, on an area of 2-3 square inches according to the tolerance of the patient. As this dries a moderate degree of whiteness should appear, otherwise the painting is repeated. The whitened appearance makes it easy to regulate the amount of painting, and to avoid excessive application which might result in ulceration. A different area may be painted at each sitting, but no part should be repainted for a month, or till the signs of cutaneous irritation caused by the previous application have entirely disappeared. Even stronger solutions, with advantage, may be applied to nodules.

OTHER DRUGS.—We have given above the lines of treatment which, after many years of careful experimentation, we have found most useful, and which we therefore recommend. We strongly urge workers with limited experience, or limited opportunities for carrying out carefully controlled experiments, to accept our recommendations as at least a basis of treatment. No one who has not become familiar, through long experience, with the course of leprosy in its many stages, phases and phenomena is qualified to evaluate the results obtained with new drugs still in the experimental stage.

The heavy metals—arsenic, antimony, mercury, gold, copper—and also the aniline dyes, are, in small doses, capable of desensitizing patients suffering from a chronic mild form of lepra reaction which is very frequently present. Probably the improvement which so many observers claim from their use is, in large measure, due to this fact.

Excessive treatment with chaulmoogra oil and other drugs, by depressing the system and thus weakening the power of the tissues to react to *B. leprae*, causes flattening out of skin lesions, apparent clinical improvement and temporary amelioration of neural symptoms, but the infection is not lessened in this way, and, in the long run, the patient's condition is found to be worse. Undoubtedly many remedies have received a false reputation on this account. We would again warn our readers that no real improvement can be made through any drug yet known apart from raising and maintaining the general health of the patient.

LIST OF INSTITUTIONS AND CLINICS WHERE TREATMENT OF LEPROSY CASES IS CARRIED OUT

<i>Province</i>	<i>Name of the Clinic or Institution</i>	<i>Address</i>
Assam.	Kongpokpi Leper Asylum	Kongpokpi, Manipur.
	Leper Asylum	Sylhet.
	Charitable Dispensary	Habiganj.
	Leper "Clinic"	Silchar.
	Charitable Dispensary	Shillong
		Tezpur.

<i>Province</i>	<i>Name of the Clinic or Institution</i>	<i>Address</i>
Assam	Gauhati Clinic	Gauhati.
	Leprosy " "	Nowgong
Bengal.	" " "	Dhubri
	Bryon Leper Home	Bankura.
	Gangajalhata Leprosy Clinic	Gangajalhata, Bankura.
	Maliara " "	Maliara, Bankura.
	Indpur " "	Bankura
	Bankura Sadar " "	"
	Onda " "	Onda, Bankura.
	Taldangra " "	Taldangra, Bankura
	Ranigunj Leper Home	Ranigunj, Burdwan.
	Rajbundu Leprosy Clinic	Rajbundu, "
	Ausgram " "	Ausgram, "
	Chakdih " "	Chakdih, "
	Atansol " "	Atansol, "
	Kulti " "	Kulti, "
	Jamuria " "	Jamuria, "
	Haripur " "	Haripur, "
	Dishergarh " "	Dishergarh, "
	Aldih " "	Aldih, "
	Saldah Clinic	Midnapur.
	Bhatmore " "	"
	Deuli " "	"
	Gorbeta " "	"
	Lalgah " "	"
	Beltana " "	"
	Rampurhat Leprosy Clinic	Rampurhat, Birbhum.
	Ilambazar " "	Ilambazar, "
	Mid. Bazar " "	Mid. Bazar, "
	Hetampur " "	Hetampur, "
	Sainthia " "	Sainthia, "
	Bolepur " "	Bolepur, "
	Nalhati " "	Nalhati, "
	Labpur " "	"
	Nanoor " "	Nanoor, "
	Kundala " "	Kundala, "
	Barudebpur " "	Barudebpur, "
	Rajnagore " "	Rajnagore, "
	Nakrakonda " "	Nakrakonda, "
	Baliyuri " "	Baliyuri, "
	Sultanpur " "	Sultanpur, "
	Bogra " "	Bogra, "
	Chittagong Sadar Leprosy Clinic.	Chittagong
	Baptist Mission Leper Hospital	Chandraghona, Chittagong.
	School of Tropical Medicine	Calcutta
	Albert Victor Hospital	Gobra, Calcutta.
	Kalighat Leprosy Clinic	Kalighat, Calcutta.
	Maniktala " "	Maniktala, "
	Port Commissioners " "	Calcutta.
	Dacca Municipal " "	Dacca.
	" Central Jail " "	"
	" Mitford Hospital Clinic	"
	Khansama Clinic	Khansama, Dinajpur.
	Setabgunj " "	Setabgunj, "
	Kalimpong Leper Hospital	Dargeeling
	Bagnon Leprosy Clinic	Bagoon, Howrah
	Chandrabag " "	Chandrabag, Howrah.

<i>Province</i>	<i>Name of the Clinic or Institution</i>	<i>Address</i>
Bengal.	Agartala Leprosy	Agartala, Hill Tippera.
	Berhampur " "	Berhampur, Murshidabad.
	Beldanga " "	Beldanga, Murshidabad.
	Bhagawangola " "	Bhagawangola, Murshidabad.
	Ramnagore " "	Ramnagore, Murshidabad.
	Kendua " "	Kendua, Mymensingh.
	English Bazar " "	English Bazar, Malda.
	Nachole " "	Nachole, "
	Kaliachak " "	Kaliachak, "
	Krishnagore " "	Krishnagore, Nadia.
	Nabadwipa " "	Nabadwipa, "
	Debagram " "	Debagram, "
	Chatmohar Leprosy Clinic	Chatmohar, Pabna.
	Sitlai " "	Sitlai, "
	Badalgachi " "	Badalgachi, Rajshahi.
	Lalitnagar " "	Lalitnagar, "
	Kashiadanga " "	Kashiadanga, "
Bihar & Orissa.	Bhagalpur Leper Asylum	Bhagalpur, B & O.
	Cuttack	Cuttack, "
	Puruha Leper Asylum and Home.	Puruha, "
	Gaya King Edward VII Memorial Leper Asylum	Gaya, "
	Saldoha Leper Colony	Saldoha, Santhal Parganas.
	Mayurbhanj Leper Asylum	Mayurbhanj State.
Bombay.	Belgaum " "	Belgaum, Bombay.
	Miraj " "	Miraj, "
	Nasik " "	Nasik, "
	Khondwa " "	Khondwa, Poona.
	Poladpur " "	Poladpur, "
	Pui " "	Pui, "
	Sholapur " "	Sholapur, "
	Friends' " "	Vengurla, "
	Acwarth " "	Matunga, "
Burma.	D.M.P. " "	Ratnagiri, "
	Mandalay Leper Home	Mandalay.
	Moulmein " "	Moulmein.
	St. John's Leper Asylum	Mandalay.
	Leprosy Clinic, General Hospital	Rangoon.
	Kemendine Leper Asylum	Kemendine.
	Hlegu Leprosy Clinic, Hlegu Hospital.	Hlegu, Insein.
	Dabein Leprosy Clinic	" "
Central Provinces.	Monywa Leper Colony	Monywa.
	Leper Colony	Kengtung.
	Mandalay Skin Clinic	Mandalay.
	Minba Leprosy " "	Minba.
	Bethesda Leper Home	Champa.
	Chandkuri " "	Chandkuri.
	Santipur " "	Dhamtari.
	Kothara Leper Asylum	Ellikpur.
	Victoria Leper Home	Jhargaw, Mungah
	" " Asylum	Patpura.

<i>Province</i>	<i>Name of the Clinic or Institution</i>	<i>Address</i>
Central Provinces.	Leper Home	Rajnandgaon.
	Raipur Leper Asylum	Raipur.
		<i>Name of the Clinic.</i>
	Dharsiwa Clinic.	Drug Clinic.
	Kharora "	Balod "
	Bhilai "	Bhatapara "
	Gurur "	Balodabazar "
	Simga "	Champa "
	Pamgarh "	Horsu "
	Nawagarh "	Anjangaon "
	Musturi "	Alot "
	Sheoringrayan "	Burhanpur "
	Patharia "	Shahapur "
	Kurud "	Pandhana "
	Hirri "	Sausar "
	Jajapur "	Khandwa "
	Palari "	Partwara Clinic in Berar.
	Arang "	One Clinic near Betul.
	Arjuni "	
		<i>Address</i>
Central India	Henderson Memorial Leper Home.	Dhar.
	Indore King Edward Hospital Leprosy Clinic.	Indore.
Hyderabad (Nizam's).	Sehore Leper Asylum	Sehore.
	Dichpali Leper Home and Hospital.	Dichpali.
	Leprosy Clinic	Narayanpet.
	" "	Kalwakurti.
	" "	Makthal.
	" "	Gulburga.
	" "	Nander.
	" "	Parbhani.
	" "	Aurangabad.
	" "	Karimnagar.
	" "	Bhir.
	Bidar Leprosy Clinic	Bidar.
	Leprosy Clinic	Osmanabad.
	" "	Nizamabad.
	" "	Armoor.
	" "	Yeilareddi.
	" "	Bodhan.
Nepal Punjab.	" "	Kamareddy.
	" "	Banswara.
	" "	Raichur.
	" "	Gungawati.
	" "	Hasamkunda.
	" "	Katamundh.
	" "	Dharamsala.
	" "	Shahpur.
	" "	Kangra.
	" "	Nagrota.
	" "	Thuri.
	" "	Paprola.
	" "	Jogindarnagor.
	" "	Sujanpur.
	" "	Kulu.
	" "	Naggur.
	" "	Jari.
	" "	Banjar.

<i>Province</i>	<i>Name of the Clinic or Institution</i>	<i>Address</i>
Punjab.	Leprosy Clinic	Jawalmukhi.
	" "	Haripur.
	" "	Dheragopipur.
	" "	Dadasaba.
	" "	Garli.
	" "	Barsar.
	Leper Asylum	Ambala City.
	" "	Chamba.
	" "	Palampur.
	" "	Rawalpindi.
United Provinces.	" "	Subathu.
	" "	Taran Taran.
	" "	Almora.
	" Home	Chandag.
	" "	Panahgat.
	" "	Kumaon.
South India.	Grace Otway Mayre Leper Asylum.	Meerut.
	Leper Home	Naini.
	" Asylum	Rurki.
	MacLaren Leper Hospital	Dehra Dun.
	Chevayur Leper Asylum	Calicut, Madras Presidency.
	Kodur " "	Kodur, Madras Presidency
	Dayapuram Leper Home	Manmadura, Madras Presidency.
	Bethesda Leper Asylum	Narsapur, Madras Presidency.
	Leper Home	Ramchandapuram, Madras Presidency.
	Philadelphia Leper Asylum	Moradabad.
	Debendra Nath Mullik Leper Home.	South Arcot.
	Vizianagram Leper Home	Vizianagram.
	Lady Willingdon Leper Settlement.	Chingleput.
	H.Q. Govt Hospital	Salem Town, Salem.
	Ammamet Municipal Dispensary Leprosy Clinic.	" "
	Nethumedu (Dewan Bahadur) S. Ellappa Chettiar's Leprosy Clinic.	" "
	Suramangalam Leprosy Clinic	" "
	Yercaud Leprosy Clinic	Salem Taluk, "
	Sendamangalam Leprosy Clinic.	Namakkal, Salem.
	Elur Leprosy Clinic	" "
	Nallur " "	" "
	Velur " "	" "
	Mohanur " "	" "
	Erumaiyatti Leprosy Clinic	" "
	Govt. Hospital " "	Tiruchengode, "
	Sankar " "	" "
	Edappadi " "	" "
	Komarapalayam (Bhavani)	" "
	Elachipalayam Leprosy Clinic	" "
	Rasipuram " "	Sub Taluk, "
	Namagiripettai " "	" "

<i>Province</i>	<i>Name of the Clinic or Institution</i>	<i>Address</i>
South India.	Govt. Hospital Leprosy Clinic	Atur, Salem.
	Viraganur	" "
	Thammampatti	" "
	Peddanayakanpalayam	" "
	Belur Clinic (Bhavani)	" "
	Omatur	Omatur, "
	Mecheri	" "
	Kadiampatti Clinic (Bhavani)	" "
	Harur	Harur, "
	Kadathur	" "
	Kallavi	" "
	Government Hospital	Salem, "
	Pennagaram	
	Palacode	
	Government Hospital	Krishnagiri, Salem.
	Nagarasampatti	Harur, "
	Kaveripatnam Leprosy Clinic	Krishnagiri, "
	Vepanapalli	" "
	Hosur	Hosur, "
	Denkanikota	" "
	Thalli	" "
	Rayakota	" "
South India, Travancore.	Allepey Mission Leper Asylum	Allepey, Travancore.
	C. Pearce Memorial Leper Home.	Neyyoor, "
	Oolampara Lepers' Hospital	Oolampara, "
	Kayameolam Leper Clinic	Kayameolam, "
	Karunagapatty	Karunagapatty, Travancore.
	Punaloor Leper Clinic	Punaloor, Travancore.
	Sherattal Hospital Leper Clinic.	Sherattal, "
	Parur Leper Clinic	Parur, "
	Chiraymkil Leper Clinic	Chiraymkil, "
	Mission Leper Hospital	Neyyoor, Colachel.
W.I State	Municipal Leper Clinic	Trivandrum.
	" " "	Nagercoil.
	West Hospital for Lepers	Rajkot.
	Rajkot Civil Station Dispensary.	"
	Bhabnagar State Hospital	Bhabnagar.
	Porbandar	Porbandar.
	Junagadh Leper Asylum	Junagadh.

LEUCODERMA

This commonly begins in early adult life and on the exposed parts of the body, very often on the neck. The hairs on the affected area also turn white and the condition may progress all over the body or stop at any time. No medical man in India could mistake the anaesthetic patches of leprosy for leucoderma, but the "syphilitic leucoderma" occasionally affecting the neck of a young woman in the secondary stage of syphilis may have a superficial similarity.

TREATMENT.—In spite of the "guaranteed cures" advertised in the weekly papers, this is unsatisfactory and generally comes down to staining the affected areas with walnut juice or potassium

permanganate solution. Ultra-violet rays in increasing doses may darken the skin.

LICE—See Typhus Fever.

LICHEN PLANUS

The leading symptom is an intractable, itching papular rash, most profuse on the flexor aspects of the limbs and the inner side of the thighs. The mucous membrane of the mouth, especially the inner side of the cheeks, is often attacked, causing milk-white streaks or patches. The disease is commonest between the ages of 20 and 50 years and takes 3-4 months to cure.

TREATMENT.—The classical remedy is *Liquor. Hydrarg. Perchlor.* one drachm t.d.s.; in chronic cases *Liquor. Arsenicalis*, beginning with 3 minim doses and working up, may be beneficial. Small patches are best treated by X-rays and for some reason lumbar puncture is often of great use.

LICHEN TROPICUS—See Prickly Heat.

LIFE INSURANCE, EXAMINATION FOR

Every Life Insurance Company has a special form consisting of two parts, (a) Questions asked by the doctor and answered by the patient. (b) A detailed description of the doctor's findings. Different companies' forms vary slightly but are similar, and all give full instructions to the examining officer. For special examinations special forms are provided.

BLOOD-PRESSURE (see also Arteriosclerosis).—Insurance companies pay great attention to this for the very good reasons that high blood-pressure is often unsuspected, and statistics show that the blood-pressure is a sure index of the expectation of life. When the blood-pressure is found to be unexpectedly high or low it should be checked at a different time on the following day. Many patients are nervous when being examined so the systolic pressure may rise considerably and the diastolic slightly. A re-check at the end of the examination will eliminate this. The writer has occasionally found that high blood-pressure in a fit young man was due to previously undiscovered coarctation of the aorta, and a very low blood-pressure may mean that the candidate is feeling faint.

The following represent the average maxima permissible without extra premium.

Age	Systolic		Diastolic
	MAXIMUM	MINIMUM	
20	139	100	82
25	141	103	84
30	141	103	90
35	142	105	90
40	143	105	90
45	144	109	90
50	146	109	90
55	148	114	93
60	151	114	94
65	153	118	95

At any age, a systolic pressure of 160 or over with a diastolic of 102 or over is uninsurable.

WEIGHT AND HEIGHT.—The following Table shows the average height for weight of European men. Indians probably average about 10% less than Europeans and women about 5% less than men.

Heights and Weights of Men 16-54 years of age (with clothes)

		<i>Feet and inches, with shoes</i>																			
<i>Age</i>	<i>In Years</i>	5'0"	5'1"	5'2"	5'3"	5'4"	5'5"	5'6"	5'7"	5'8"	5'9"	5'10"	5'11"	6'0"	6'1"	6'2"	6'3"	6'4"	6'5"		
16		109	111	114	117	120	124	128	132	136	140	144	149	154	159	164	169	174	179		
18		113	115	118	121	124	128	132	136	140	144	148	153	158	163	168	173	178	183		
20		117	119	122	125	128	132	136	140	144	148	152	156	161	166	171	176	181	186		
22		119	121	124	127	131	135	139	142	146	150	154	158	163	168	173	178	183	188		
24		121	123	126	129	133	137	141	144	148	152	156	160	165	171	177	182	187	192		
26		123	125	127	130	134	138	142	146	150	154	158	163	168	174	180	186	191	196		
28		125	127	129	132	135	139	143	147	151	155	159	164	170	176	182	188	193	198		
30		126	128	130	133	136	140	144	148	152	156	161	166	172	178	184	190	196	201		
32		127	129	131	134	137	141	145	149	154	158	163	168	174	180	186	192	198	203		
34		128	130	132	135	138	142	146	150	155	160	165	170	176	182	188	194	200	206		
36		129	131	133	136	139	143	147	151	156	161	166	171	177	183	190	196	202	208		
38		130	132	134	137	140	144	148	152	157	162	167	173	179	185	192	198	204	210		
40		131	133	135	138	141	145	149	153	158	163	168	174	180	186	193	200	206	212		
42		132	134	136	139	142	146	150	154	159	164	169	175	181	187	194	201	208	214		
44		133	135	137	140	143	147	151	155	160	165	170	176	182	188	195	202	209	215		
46		134	136	138	141	144	148	152	156	161	166	171	177	183	189	196	203	210	216		
48		134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217		
50		134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217		
52		135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212	218		
54		135	137	139	142	145	149	153	157	163	168	173	178	184	191	198	205	212	219		

Allow 1 inch for shoes and 10 pounds for clothes.

Notes.—(1) The average height and weight, in the majority of Indian races, is lower than that of Europeans. Buchanan gives the average weight of a Bengali at 109 lb., and a Lema, of a U.P. man, at 110 lb.

(2) Buchanan's formula for calculating the weight from the height is 5 feet=100 lb., and add 3 lb. for every full inch above 5 ft.; or in men over 5 ft. 8 in., add 4 lb. for each inch.

Example: 5 ft. 6 in.=100+3×6=118 lb.
(3) The chest circumference should increase from $\frac{1}{2}$ to 1 inch with every inch in height, in men, between 5 ft. and 6 ft. 1 in.

In general, underweight is looked on with suspicion before middle age and overweight afterwards. Any candidate whose weight is more than 30 lb. over the average will probably have to pay extra premiums.

LUNGS.—In the case of young people who are underweight and have a family history of tubercle or a personal history of pleurisy, further tests will be required, including an X-ray of the chest. Active tubercle is uninsurable, but "cured" cases must be treated on their merits, full X-ray and laboratory examinations being required.

CIRCULATORY SYSTEM.

Pulse.—When this is over 90, take the patient's temperature and carefully examine the thyroid. A pulse persistently over 85 calls for increased premium and most companies reject a pulse persistently over 95. (For causes, see Heart Disease.)

Cardiac Murmurs.—A case with a suspected functional murmur is generally referred to a cardiologist, an extra premium being demanded if the murmur is proved to be functional.

Of the organic murmurs only that due to fully compensated, non-progressive mitral disease is insurable on any basis, and generally at an increased premium.

Mitral disease accounts for about 80% of organic murmurs.

Condition of the Heart and Vessels.—If cardiac enlargement is more than slight—as proved by X-ray examination, if there is myocardial degeneration, aortic disease, coronary disease, angina or any signs of old hemiplegia, the candidate is uninsurable.

SYPHILIS AND GONORRHOEA.—Few candidates for life insurance will confess to having suffered from either disease, but if the examiner has the least suspicion, laboratory tests must be made. Cured gonorrhoea without any sequelae whatever, may, in these days of chemotherapy be disregarded, but the penicillin treatment of syphilis has not been in use long enough to effect any change in the companies' attitude.

"Cured" syphilis must have had repeated negative Wassermann or Kahn tests over a period of 6 weeks to 6 months after completion of treatment; even so, most companies add between 5 and 10 years to the age of the candidate at the time of examination. Cases with a positive blood test are uninsurable.

ORGANIC NERVOUS DISEASE.—This generally renders the applicant uninsurable.

GOITRE.—

Graves's Disease is usually uninsurable within the first three years, but may be accepted after six or seven years if heart and Basal Metabolic Rate are normal. If a successful operation has been performed the case may be considered after a year has elapsed; reports from the surgeon are usually called for.

Simple Goitre.—Insurability depends upon the size, duration and effect of the goitre and upon the results of operation.

EARS.—A history of middle-ear disease cured by operation or chemotherapy and leaving a healthy drum without perforation is no drawback, but always examine the drum. Chronic otorrhoea demands extra premiums and is a bar to insurance with some companies.

THE URINE.—Diabetes mellitus or nephritis renders the life uninsurable. In doubtful cases laboratory investigations of blood-sugar curves, blood-urea, the presence of casts, etc., may be made, the cost generally being borne by the candidate and the results submitted to the Head Office for decision. "Orthostatic Albuminuria" is not uncommon in healthy young men especially after exercise, but there should be no casts, no rise of blood-pressure, and no albumin in the early morning specimen of urine.

PEPTIC ULCER.—Usually uninsurable within about two years of first symptoms or of operation, and insurable at increased rates thereafter.

APPENDICITIS.—No increased premium when more than three months have elapsed after successful operation, but increased premium or rejection likely if there are signs of adhesions or complications.

PREGNANCY.—Examination is generally deferred until after parturition, but if examination is insisted on, parity, age, previous history and the local and general condition of the patient must be considered in assessing the first year's premium.

MALARIA.—Recent attacks require deferment of examination and an enlarged spleen calls for an extra premium.

DYSENTERY.—A history of chronic or recent dysentery calls for a laboratory report on the stool, most companies decline to insure unless this is negative. If there is any suspicion of amoebic dysentery, look carefully for hepatitis.

INTEMPERANCE.—The medical examiner must remember that he is the servant of the insurance company, not the benefactor of the patient and that the report is a confidential, privileged communication. Even the most dissipated-looking individual seldom confesses to intemperance, and all drug addicts are liars. The doctor therefore bases his opinion on what he finds, not on what he is told.

LIVER (*See also* Hepatitis and Cirrhosis of the Liver.)

LIVER, ACUTE NECROSIS OF

Very occasionally this follows an attack of jaundice or may result from T.N.T., arsenical, cinchophen or chloroform poisoning.

No treatment is of any avail except glucose, which should be given by mouth and intravenously.

These patients are sometimes acutely maniacal and need severe restraint and large doses of narcotics.

LIVER, WOUNDS AND INJURIES OF

Rupture of the liver is a very fatal accident and little can be done. Wounds of the liver, such as stabs, are difficult to deal with on account of the haemorrhage, sutures often cutting out; the best plan is to pack with dry gauze which is left in for four days.

LUDWIG'S ANGINA—*See* Angina of Ludwig.

LUMBAGO—*See* Backache, Fibrositis and Nervous Diseases (Sciatica).

LUMBAR PUNCTURE

This is usually made in the space between the third and fourth lumbar vertebrae, which lies on or just above a line connecting the highest points of the iliae crests. If the needle cannot be made to enter this space try the one above or the one below; the one above is generally easier; the space between the first and second lumbar vertebrae may also be used, especially for high spinal anaesthesia, but is not recommended for habitual use.

Important points are:

- (1) Use a fine needle, the usual one "as supplied" is far too thick. A fine needle generally makes the use of local anaesthesia unnecessary, but this should always be given to a nervous patient.
- (2) See that the patient's spine is strongly flexed. In the lateral position, the chin is held gently but firmly on the flexed knees by an assistant.
- (3) The bevel of the needle should face to one side, it thus splits the longitudinal fibres of the dura mater instead of cutting across them; this minimizes post-operative leakage of cerebrospinal fluid and makes headache less likely.
- (4) Insert the needle in the middle line, the point aiming at the umbilicus.
- (5) As the point meets the ligamentum subflavum at a depth of about $2\frac{1}{2}$ inches, distinct resistance is felt, rather as though a second skin were being punctured, after which all resistance ceases and the needle goes straight through the dura and arachnoid; the point now lies in the spinal canal. The stylette is removed and cerebrospinal fluid comes out. The needle is pushed in one millimetre further to make sure that the whole bevel is inside the canal.
- (6) If there is an escape of blood, let the fluid run until it becomes pale pink. If it remains red, try another space; if there is still a flow of blood, abandon the attempt.

LUNGS, OEDEMA OF—See Heart Disease.

LUPUS

This hitherto almost incurable disease has lately been found to yield to enormous doses of vitamin D, 150,000 units (three tablets of High Potency Ostelin Tablets, Glaxo) being given every day for two months or longer. Calcification of the kidneys, which has proved fatal in some children after more than 10,000 units a day for prolonged periods does not seem to occur. Two absolute contraindications to the treatment are arteriosclerosis and kidney disease of any sort. Possibly in those cases in which calcium deposition took place there was some unsuspected renal abnormality. Even if calcium deposition occurs it all disappears within a few months of cessation of treatment.

During treatment the patient must be carefully supervised and never allowed to carry it out "on his own." The urine should be measured and examined once a week and, whenever possible, blood-calcium estimations made.

LUPUS ERYTHEMATOSUS

This usually appears as a thickened area with a raised hyperaemic border; it is commonest on the face, where it has the typical

"butterfly" distribution, the nose forming the body of the butterfly. It is usually symmetrical, but may appear in the disseminated form or affect mucous membranes.

The following methods of treatment are all effective:

- (a) Chemotherapy by means of penicillin (100,000 units for 24 hours in 8 doses) and sulphadiazine or sulphathiazole two tablets four times a day.
- (b) Weekly gold injections, e.g., Myocrisin, 0.01 gramme intramuscularly, gradually increasing to 0.1 gramme, 10-12 injections being given.
- (c) Weekly bismuth injections, e.g., Bismostab, Bisglucol, Neo-Gardyl, etc.
- (d) Stovarsol, one or two tablets a day for 3 days, followed by another 3-day course after a 3-day interval.
- (e) Locally a sulphathiazole-penicillin ointment may be used; 5% bismuth ointment is also successful, or calamine lotion may be applied.
- (f) Septic foci should be carefully sought for and eliminated.

LYMPHADENOMA (Hodgkin's Disease)

This is a discrete and ultimately fatal enlargement of the lymph glands; it generally begins in the neck and is often accompanied by a curious kind of fever called Pel-Ebstein fever, in which for a period of several weeks quite high temperatures are recorded, followed by a remission of varying length.

The only treatment that keeps the enlargement of the glands in check is deep X-ray therapy, but the disease wins in the end, although chronic cases may live as long as 20 years.

The surest way of making a correct diagnosis is to excise a gland and have it sectioned and microscopically examined at a laboratory.

Other causes of general enlargement of the lymphatic glands are tuberculosis, glandular fever, secondary syphilis, German measles, lymphatic leukaemia, lymphosarcoma and plague, the commonest being tuberculosis.

LYMPHOGRANULOMA INGUINALE—See Venereal Diseases.

MALARIA

Of the four kinds that infect human beings two are common and two are uncommon.

COMMON VARIETIES

(a) **BENIGN TERTIAN (*PLASMODIUM VIVAX*).**—The incubation period is about 10-18 days, but the disease, especially in relapses and re-infections, may lie dormant for months, often being brought out by over-exertion, a chill, or some such factor.

Except in multiple, mixed or old infections the paroxysms occur every other day and last about 12 hours, the cold stage occupying an hour or two, the hot stage two or three hours and the sweating stage about six or eight hours. These figures, however, are liable to

considerable variation; there may be vomiting in the cold stage and hyperpyrexia in the hot.

B.T. malaria seldom kills directly, but is one of the great world-causes of illness and invalidism. It is commonest in the more temperate of the malarial zones.

Prolonged and thorough treatment is necessary for a radical cure.

(b) **MALIGNANT TERTIAN (*PLASMODIUM FALCIPARUM*)**.—The incubation period is probably shorter—between 6 and 14 days—depending upon the heaviness of the infection and the resistance of the patient. The disease is called malignant because of the occurrence of death-dealing symptoms, namely *cerebral malaria*, in which unconsciousness and death may occur in a few hours with very few premonitory symptoms; such cases are often diagnosed as heat-stroke, to the great detriment of the patient. Another serious type is *algid malaria* in which there is little or no fever, but profound collapse. Next comes *malarial diarrhoea*, which is apt to be diagnosed as dysentery or even cholera, and finally, as a sequel to many badly treated attacks or re-infections, comes *black-water fever* (for symptoms and treatment see under that heading).

Even in uncomplicated cases the attacks of fever in M.T. malaria often do not have the predictable regularity of those in B.T. malaria, the cold stage perhaps being less noticeable or even absent, and the fever lasting longer, sometimes several days.

Fortunately, malignant malaria is quickly and completely cured by modern remedies. It is commonest in the tropical and sub-tropical zones.

UNCOMMON VARIETIES

(a) **QUARTAN MALARIA (*PLASMODIUM MALARIAE*)**.—This resembles B.T. malaria in the nature of its paroxysms, its tendency to persist in spite of treatment, its relative freedom from fatal complications and its incubation period. As its name implies, the paroxysms come on every fourth day, the day of the previous paroxysm being included. The writer has seen very few cases in India, though they do occur, especially in children. Nephrosis is said to be a complication, but most of the cases of albuminuria with oedema that the writer has seen have been associated with a chronically enlarged spleen, cirrhosis of the liver and marked anaemia following a chronic M.T., B.T. or mixed infection.

(b) **BENIGN OVALE MALARIA (*PLASMODIUM OVALE*)**.—This is so benign that it often cures itself after a few paroxysms. It is amenable to drug therapy but in other ways resembles mild B.T. malaria.

PREVENTION.—This can be achieved in various ways.

(a) *Avoidance of infected areas.*—Between three-quarters of a mile and a mile is usually considered a safe distance. To discover whether or not a village is infected examine the children's spleens, as children form the chief reservoir of malaria.

The risk that an outsider will catch malaria rises rapidly with the percentage of children having palpable spleens, the Indian Army standard being as follows:

Percentage	Risk
Less than 10	Low
10-30	High
Above 30	Prohibitive

(b) *Prevention of Mosquito Breeding.*—By far the most important measure is the avoidance of standing water near dwelling houses. Many years ago the writer discovered a rich crop of mosquitoes breeding in the fire-buckets outside the commandant's office in a military hospital, and very recently an equally large crop in a vase of flowers occupying the place of honour in a fashionable drawing-room. Particular care must be taken near bathtubs and kitchens and in gardens, where a "dry day" must be observed every week.

In the plains, pools should be drained and vegetation at the edges cut away, but in the foothills, jungles and swamps generally are better left alone.

Wherever possible a malaria survey should be undertaken, endemic areas marked on a map, and particular attention given to them. The habits of the local mosquito may also be studied, e.g., whether it breeds in standing or flowing water.

Oiling.—This is satisfactory for small drains or tanks used for gardens, but not for large areas of water. The usual mixture is two parts of crude oil to one of kerosene and the usual quantity is one ounce of the mixture for every square yard. The water must be clear of weeds and the oiling done weekly.

D.D.T. (see also D.D.T.).—The addition of D.D.T. to kerosene oil in the strength of 5% makes an enormous difference, four minims of the mixture being sufficient for a square yard of water. Large areas of water, swampy areas and jungle can be treated, or the mixture can be sprayed from an aeroplane. Another method of applying D.D.T. is in the form of dust, the chemical being mixed with fine dust so that about two ounces of D.D.T. are used for each acre of swampy land. If there is much vegetation, about a pound is required for each acre. The effect of the D.D.T. lasts for three weeks or longer.

Paris Green.—This substance in a strength of 2½%-5% mixed with slaked lime or fine dust is harmful only to anopheline larvae and can be scattered on the surface of the water or sprayed by a special apparatus; it is particularly suitable for large areas of water, paddy fields and village ponds.

Fish.—The small fish known as "millions" (*Gambusia*) are very suitable for tanks and wells, one or two dozen being introduced initially and renewed every six months or so. They feed on the mosquito larvae.

DESTRUCTION OF MOSQUITOES.—

Pyrethrum Spray kills mosquitoes almost instantly, the usual strength being one ounce of 2% pyrethrum concentrate to a pint

of third-grade kerosene oil. This should be sprayed round all dark places such as under the beds of dwelling houses and also used at night when mosquitoes come out. Any form of "Flit-gun" may be used, or the American "bomb."

D.D.T. added to the above spray in the strength of 5% adds to its efficiency enormously, as all mosquitoes that settle on *D.D.T.*-sprayed walls during the ensuing fortnight will perish. The whole house and surroundings should be sprayed, the emulsion with water being the most economical. A house in the centre of a square mile of land or swamp treated with *D.D.T.* will never be visited by mosquitoes.

Mosquito Traps are not very effective and have been superseded by *D.D.T.* Fly flaps, Incense and Katol coils are all good for individual use.

Personal Protection may be summed up as consisting of wire gauze to doors, windows and verandahs, mosquito-nets for beds, long sleeves, trousers, mosquito-boots and insect repellants for human beings.

SUPPRESSION OF MALARIA.—Even when living in a highly infected area a person can suppress the disease entirely if he takes either two tablets of mepacrine (100 mg. each) every night for a week, followed by one tablet every night as long as he is in the area, or preferably one tablet of 100 mg. of Paludrine once a week.

There is evidence that if he continues with his weekly dose of Paludrine for six months after leaving the infected area, even *B.T. malaria*—the hardest to cure—will never develop.

Mepacrine has the drawback of turning the patient yellow and inducing a certain amount of lassitude, and also that when the patient leaves the area he must undergo a full course of treatment if he wishes to avoid developing malaria.

TREATMENT.—Owing to the shortage of quinine and the vast numbers of troops in malarious regions during World War II, the Allies took advantage of the ingenuity of their German enemies and made large quantities of Atebrin (mepacrine) and Plasmoquine (pamaquin) which they used with very great success; indeed, the defeat of the Japanese in Burma was largely due to these drugs. Having conquered their enemies, the British, as a result of one of the most brilliant researches in biological chemistry that has ever been known, produced Paludrine, which, if not the perfect anti-malarial drug, comes very near it. These researches were carried out by Curd, Davey and Rose in the laboratories of Imperial Chemical Industries.

Treatment of an uncomplicated attack.—First examine the patient's blood so as to confirm the diagnosis and to establish the type of malaria, but if the symptoms are obvious and still more, if they are severe, do not withhold treatment because the slide is negative or examination is delayed.

Mepacrine Treatment.—

Days 1 and 2.—Give two tablets (100 mg. each) of mepacrine three times a day. In the case of sturdy people weighing more than 10 stone (140 lb.) give three tablets three times a day. Some physicians give 10 grains of quinine three times a day instead of mepacrine during the first two days. The writer found this most successful in Assam when dealing with large numbers of troops.

Days 3 to 7 inclusive.—Give one tablet of mepacrine three times a day.

The above treatment will generally cure a pure M.T. infection, but in the case of a severe, doubtful, mixed or B.T. infection, proceed as follows:

Days 8 and 9.—No medicine.

Days 10-14 inclusive.—Give pamaquin, one tablet (10 mg.) with quinine 10 grains, three times a day.

In severe or chronic infections, or when the patient has undergone previous courses of treatment, the pamaquin-quinine treatment is carried out for 10 days instead of 5.

Pamaquin may cause cyanosis or methaemoglobinuria; if so, it should be stopped and methylene blue (2-5 grains three times a day) given, with plenty of fluids, until the condition has cleared up.

Paludrine Treatment.—The best method has not been finally settled, but in clinical (village) malaria the optimal single dose appears to be 300 mg. Hamilton Fairley, working with others in Australia, and Macgregor, working with others in England, came to the following conclusions.

B.T. Malaria.—A single dose of 100 mg. Paludrine achieves a clinical cure; it by no means prevents relapses, but it seems probable that the taking of 100 mg. twice a week for six months brings about a permanent cure.

One hundred milligrams three times a day for a fortnight not only cures the attack but prevents relapses for some months, or in some cases for ever. This treatment is followed by a twice-weekly dose of 100 mg. for six months.

Research workers at the Malarial Institute of India (personal communication) have had equally good results from giving one tablet (100 mg.) of Paludrine twice a week for three months. Children under eight are given half doses.

Treatment of the primary attack.—The treatment of choice is 100 mg. of Paludrine three times a day for ten days (30 tablets in all).

M.T. Malaria.—A single dose of 100 mg. of Paludrine achieves a clinical cure, and a twice-weekly dose for three months makes it permanent.

A fortnight's treatment with 100 mg. three times a day also achieves a permanent cure.

Toxic Symptoms.—These are unknown with a single dose of less than 500 mg. or a daily dosage of less than one gramme, both

of which are far above the effective therapeutic dose. Symptoms when they do occur consist of epigastric pain, vomiting, diarrhoea and haematuria; recovery is rapid and there is no damage to the kidneys.

Apart from its greater effectiveness Paludrine has several advantages; it does not upset the patient, it causes no damage to the liver or any other organs, it is colourless, and needs to be taken much less often than any other remedy. Work is continuing in the search for a drug which will quickly and permanently cure B.T. malaria.

TREATMENT OF SPECIAL SYMPTOMS.—

Cerebral Malaria.—The immediate treatment is to give 6 grains of Quinin. Bibydrochlor. in 5 c.c. of water intravenously, followed by a similar injection an hour later, and a third one after another hour if required. The writer has found no advantage in adding adrenaline or Pituitrin to the injection, but rather the reverse, adrenaline sometimes causing palpitation and Pituitrin causing diarrhoea. If intravenous injection is impossible give 10–15 grains intramuscularly in 2 c.c. of water into the upper and outer quadrant of the buttock; if complete asepsis is observed there is no fear of causing an abscess.

Instead of a quinine injection one ampoule (0.36 gram) of mepacrine methanesulphonate may be given intravenously.

Hyperpyrexia.—Tepid sponging and an ice-bag to the head form the best treatment. One dose of intravenous quinine or mepacrine may be given as well.

Algid Malaria.—Give intravenous quinine or mepacrine as for cerebral malaria. Brandy by the mouth, injections of Coramine, warmth to the body and a plasma or blood transfusion of not more than 10 ounces should also be given.

Blackwater Fever.—See Blackwater Fever.

MALTA FEVER

This is acquired from unboiled goat's milk and is not uncommon in Northern India; the incubation period is about 14 days.

The leading features are prolonged fever of the typhoid type with a tendency to relapse, severe joint pains, sweating even when the temperature is high, and the fact that the patient does not seem so ill as he should do. The agglutination test is positive after the first week, with a rising titre, which begins at about 1:40 and may go as high as 1:1,000.

TREATMENT.—Chemotherapy has proved disappointing, neither the sulphonamides nor penicillin being of value.

Some success has followed the intravenous injection of euslavine (10 c.c. of a 2% solution once a week). Injections of acriflavine are not advised because of the jaundice they produce, but Acriflavine Intravenous (I.C.I.) is free from this sequel. After intravenous flavine the patient is said to suffer from temporary photophobia, so should be in a darkened room.

The writer has thought that intravenous Urotropine (hexamine), 10 c.c. of a 20% solution daily, was beneficial, but did not have enough cases to justify a conclusion; at any rate it is harmless.

Other treatment is as for fevers in general; tepid sponging when the temperature is over 103 degrees, local heat to painful joints and analgesics such as aspirin when required. Pyramidon should be avoided because it sometimes produces agranulocytosis.

Abortus Fever is closely allied to Malta fever and is acquired from unhoiled cow's milk. It is said that 40% of cow's milk is infected with *Brucella abortus*, so the disease must be much commoner than it is usually thought to be. Symptoms are much milder than those of Malta fever, but abortion has been recorded in women. Many otherwise normal people give a positive serum reaction, showing that at some time they have suffered from the disease.

MANIPULATIVE SURGERY

This branch of Surgery, which has lately received more attention, was practised in ancient times; it may be defined as the art and practice of moving joints for therapeutic reasons. Until recently it was neglected by the profession largely on account of its use being misunderstood and on account of its association with "bone-setting".

This therapeutic manipulation is undertaken to improve or fully restore the normal movements of a joint in those conditions which are amenable to this form of treatment; it would not, of course, be employed when there is mechanical obstruction from bone conditions such as osteophytes and malunited fractures, or in the case of a tuberculous joint when the disease is still active, as manipulation in such a case, far from doing good, would cause a flare up of the trouble.

As a rule when dealing with a painful joint, if there is limitation of movements in all directions, the case is one of arthritis, whereas pain, with free movement in some or perhaps all directions, suggests an extra-articular cause. In the early stages of a case, rigidity is due to protective muscular spasm; later, secondary contractures of muscles will have developed. In order of incidence the loss of normal movement of a joint is due to: (1) Muscular spasm; (2) Adhesions either within the joint from synovitis or extra-articular; (3) Contraction of the surrounding tissues in adaptation to the altered conditions; (4) Changes in the joint surfaces and possible formation of osteophytes; (5) Ankylosis by fibrous tissue or bone.

The formation of adhesions should be prevented by active movements. These should begin when the more acute symptoms have subsided, i.e., when the acute pain and tenderness have gone and the swelling is decreasing. Early passive movements are not advisable, but after a fortnight are useful, and should consist of a single movement in each direction, the range, if possible, being increased daily. If, however, either active or passive movements cause:

(1) Persistent pain, and (2) Daily decrease of movement, they must be immediately stopped and the joint rested; on the other hand, increased mobility indicates the practice of more and more movement.

Before manipulation the joint should be treated with heat—hot sand-bags if no other method is available—for a week or ten days beforehand as heat softens the tissues. Full anaesthesia will be required if the patient is muscular and the adhesions firm. Speaking generally, the joint should be moved to its full range in all movements and combinations of movements, with two exceptions—when there is great resistance, and in the case of the shoulder joint; in these cases the manipulation should be done in stages repeated at intervals of 7–14 days for 3 or 4 sittings.

In the case of the knee-joint, effusion may occur after movement but should be disregarded, as it will disappear as the tone of the parts improves with exercise. In those cases in which the resistance is gradually overcome by stretching, the prognosis is not so good as when manipulation results in definite snapping of adhesions. It should be made a general rule that no joint should be manipulated unless previously examined by X-rays, to exclude such conditions as advanced osteo-arthritis, gross bony obstruction, loose bodies in the joint or joint disease, all of which are unsuitable for manipulation. It must also be remembered that there are cases of adhesions which are too firm to be dealt with by manipulation, such as occur after suppuration (osteomyelitis); attempts to break these down by forcible movement would almost certainly result in fracture of the patella in the case of the knee, and of the humerus in the case of the shoulder. Apart from injuries, deformities such as club-foot call for manipulation in some part of the course of their treatment.

MARASMUS (*See also* Starvation.)

Wasting in infants apart from gross organic disease such as congenital syphilis, congenital pyloric stenosis, congenital heart disease or tuberculosis is becoming less and less frequent as general management and care of infants improves. In the treatment of these cases general hygiene is of the first importance, a nurse giving up her whole time to the case; cleanliness, warmth, fresh air and sunshine with correction of diet and sufficient quantities of vitamins are essential. Some unexpected cases recover after a prolonged struggle, but there are cases which no skill can save.

MASSAGE

Massage and allied methods of treatment are described in the oldest Hindu and Chinese books. It is an excellent therapeutic measure, and its range of usefulness has been greatly extended during recent years, but there are conditions in which it cannot be used with benefit to the patient, and cases come under one of two heads:

1. When stimulating massage is administered to a patient, who is physically and mentally tired out, and therefore unable to react to the treatment.

2. The misuse of massage, whereby a mechanical treatment of a muscle is expected to produce results that can only be ultimately achieved by voluntary contraction or re-education of that muscle.

THE GENERAL PRINCIPLES OF MASSAGE

Attention to detail is of first importance, and the position of the patient and masseur may make the difference between success and failure. There must be a reason for every movement and position. There are two possible effects of any massage manipulation, viz. (1) Reflex, and (2) Mechanical, and these are of equal importance.

1. **REFLEX.**—Examples of reflex action are the stimulation of peristalsis, the relief of muscular spasm in fractures, and the production of sleep in the insomnia of the neurasthenic.

2. **MECHANICAL ACTION.**—Examples are:

- (1) By assisting the absorption of inflammatory and effete products.
- (2) Acceleration of the lymph flow.
- (3) Tension on structures which it is desired to stretch or free.
- (4) Restoration of tone to muscles weakened by disuse or disease.
- (5) The effect of direct pressure on the abdominal organs.

THE MANIPULATIONS OF MASSAGE

The following manipulations are all more or less employed whenever massage is performed:

1. **STROKING OR EFFLEURAGE.**—This term is applied to all stroking movements. The part to be massaged is stroked firmly and slowly in the direction of the venous flow; usually, it is carried out with the ulnar edge of the hand, but one finger or the whole palm may be used.

In all cases, the treatment should begin and end with this movement. This method is of the greatest value in eliminating spasm, owing to the rhythmic, painless stimuli which constantly impinge upon the same area of the central nervous system as that which is concerned in the motor irritative phenomena. For instance, many cases of Colles' fracture may be reduced with the minimum of effort and pain if effleurage has been practised twenty minutes previously.

2. **KNEADING OR PETRISSAGE.**—This consists of five movements, namely, (1) Kneading, (2) Rolling, (3) Ironing, (4) Pieking up, and (5) Friction.

It is used to imitate the normal muscular action; the muscles are drawn away from the bones and from each other. This is the most difficult to learn. It consists of grasping the skin or muscle to be massaged and kneading, alternately tightening and loosening the hold, from the periphery towards the centre of the body. It is desirable to use both hands at a time for larger muscles, but neither the skin nor the hairs must be dragged on so as to cause pain. Sometimes, as in the arm, it is possible with one hand to work on

the muscles on one side, and with the other hand to work them on the other side, and at the same time to press and roll the opposite muscles together or against the bone.

3. RUBBING OR FRICTION.—This consists in rubbing rapidly in small circles, from the periphery of the body towards the centre, with the finger-tips or the whole hand. It is used chiefly over nerve roots or near bones to stimulate nerves and to break down superficial adhesions.

4. PERCUSSION OR TAPOTMENT.—This includes four movements, viz. (a) Hacking, (b) Pounding, (c) Clapping, (d) Flicking—a complicated rotary movement which requires great practice. These movements have the opposite effect to effleurage and act principally on the nerve trunks. They consist of striking a number of blows in quick succession, either with the tips of the fingers, or the edge of the hand, or the whole hand. When the finger-tips are used, the blow should be delivered from the wrist; this stimulates the skin, but when stimulation of muscles is required, the blows should be made in a chopping manner, with the edge of the hand, in series, along the length of the muscle, transverse to its long axis. Various mechanical devices are occasionally used to strike a number of rapid blows. To carry out these movements efficiently, considerable manual strength and delicate touch are necessary.

As an example of massage of a part, we may take the lower extremity. If the hair be long it should be cut close; then, beginning at the toes, the foot may be stroked several times with the ulnar edge of the hand on both dorsum and sole; the same should be done to the leg from the ankle to the knee, and the thigh from knee to the hip. For these larger parts it may be well to use the whole hand. If we recollect the arrangement of the valves, it is easy to see that the desired object of aiding the flow in the superficial veins will be attained by this stroking, which must always be in the direction of the venous flow; if there be a difficulty in accomplishing this, as in the back, the stroking should be in a uniform direction. Again, beginning at the toes and working upwards, a fold of skin should be pinched up between the thumb and forefinger and lightly kneaded so as to give no pain, and the whole skin of the limb should be treated in this way; the beneficial effect in aiding the cutaneous circulation is at once seen in the redness produced—both the hands may be employed, one following the other. After this, the muscles are to be grasped between the thumb and fingers or, if it be more convenient, between the fingers of the two hands and thoroughly kneaded from below upwards, the aim being to accelerate the flow of lymph and blood in them. Next, the limb may be rubbed in small circles, from below upwards, in the manner already described, after which percussion may be applied also from below upwards; and lastly, passive movements should be made of all the joints, such as the toes, ankles, knees and hips, partly for the same object as that for which the muscles are kneaded, and partly to aid the absorption of any fluid there may be in them.

It must be remembered that:

- (1) Pain must never be produced by massage.
- (2) Always massage in the direction of venous return.

Violent rubbing and manipulation, by professional wrestlers and other muscular persons, is strongly condemned, as the writer has frequently seen the most serious consequences. Energetic rubbing in of mustard and other non-sterile oils, with unwashed hands, often leads to extensive abscesses.

CONDITIONS IN WHICH TREATMENT BY MASSAGE IS ESPECIALLY BENEFICIAL

SURGICAL CONDITIONS

1. **RECENT INJURY.**—By firmly binding the part, clotting takes place in the injured vessels and so prevents further effusion. With the other hand, effusion, which has already taken place, is completely removed in a few minutes, and the part is then firmly bandaged over several thicknesses of cotton-wool, but massage in this case is only a preliminary to mobilization.

2. **FRACTURES.**—The object is to maintain the nutrition of the part and mobility of the joint, and to prevent muscular weakness and oedema.

Friction directly over the line of fracture must be avoided until union is complete; otherwise it may lead to excessive formation of callus. Increased tenderness at the site of the fracture indicates irritability of the callus, due to strain, and mobilization must at once be stopped. Special care must always be taken to support firmly the ends of the broken bones. Sudden onset of pain and oedema is probably due to thrombosis, and treatment must be immediately suspended.

3. **DISLOCATION.**—It is remarkable the ease with which many dislocations can be reduced after massage has been carried out for a short time.

4. **SPRAINS.**—Effleurage is employed twice a day until all effusion has disappeared. Then the whole surface of the muscles which move the joint should be dealt with, with effleurage over the injury. Petrissage is used as soon as it can be given without pain. The treatment is usually continued for about three weeks.

5. **AFTER-EFFECTS OF INJURY.**—These include loss of muscular power, scars, adhesion and stiff joints. In these cases much depends upon whether the case has been complicated with sepsis. If so, the *treatment will be greatly prolonged and the prognosis less favourable*. In dealing with a recently healed scar, no movement must be made, which tends to separate the edges until after a period of three to four weeks.

Stroking becomes firmer and firmer, followed by compression movements, and a mechanical vibrator is often helpful in these cases.

In dealing with stiff joints, the parts above the articulation must first be thoroughly rubbed, then given movements that are useful for stretching and breaking down adhesions over the stiff parts.

6. **DEFORMITIES.**—In the treatment of deformity, massage is an accessory; it may be used to improve the nutrition of the part before operation by the orthopaedic surgeon but after operation restoration of function will depend upon exercise, and exercise alone.

MEDICAL CONDITIONS

1. **HEART DISEASE.**—Massage can be of use in cardiac cases by securing its marked sedative effect, by relieving insomnia, restlessness and distress, by aiding the elimination of waste products from muscles and so giving the heart muscle a purer blood supply; any holding up of the venous circulation is removed, thus helping the arterial circulation. Treatment is usually applied by effleurage and slow rhythmical petrissage to the limbs, treatment being stopped if there are any signs of distress.

2. **CONSTIPATION.**—Before treatment is commenced, the case must be carefully studied as the constipation may be the result of a malignant growth, the formation of a bad habit, defects in diet, or lack of sufficient fluid; the last is a frequent cause in the tropics. Abdominal massage deep over the colon, and working in the direction taken by the contents of the bowel, is used. A combination of kneading and percussion rarely fails to cure cases of chronic constipation in the course of a few weeks.

3. **NEURASTHENIA, HYSTERIA.**—The fatigue, depression and irritability of the neurasthenic are to be met by only the most careful handling.

MEASLES

Among the non-immune, measles and smallpox are the most infectious of all diseases for the simple reason that the rash does not appear, and therefore the diagnosis is not made, until the third or fourth day, by which time the damage is done. In adults the rash may not appear for a week.

Any young patient with fever, catarrhal symptoms and sore eyes should be considered as a possible case of measles, and Koplik's spots carefully looked for. These appear two or three days before the rash, being visible on the second day on the inside of the cheek, level with the second molars; they are not easy to see, but must be carefully searched for because they are usually there. They consist of small milk-white spots surrounded by a small red areola, and are easier to see by daylight than by artificial light. They disappear when the rash appears. A consulting physician to the forces was asked to see a distinguished officer's daughter because she had fever; he pronounced the disease to be influenza, but on the next day she came out in a typical measles rash; had he looked for Koplik's spots his reputation would have gone up instead of down.

IMMUNE SERUM PROPHYLAXIS.—There are two methods, (1) in this a complete but very short (3-4 weeks) immunity can be

produced, or (2) a modified attack can be permitted which confers a lifelong immunity; it is just a question of when the immune serum is given. The former is useful for sickly children who can be removed from the risk of infection, but the latter is preferable for healthy children who have to fight the battle of life.

In both methods serum from a convalescent patient, taken within a fortnight of recovery, is given intramuscularly, the dose being 5 c.c. in patients under 3 years old and 5-10 c.c. in older patients. If convalescent serum is unobtainable double the dose of serum from an adult who has had measles may be given.

To produce temporary complete immunity give the serum within 5 days of exposure to infection; to permit a light attack of measles which will confer lifelong immunity, give the serum between 5 and 10 days after exposure; the serum, needless to say, should be Wassermann negative.

Placental extract (Immune Globulin (P.D. & Co. or Lederle Laboratories) and Embryonin (Bioglan) can be used in the same way and in about the same dosage as convalescent serum. Reactions such as fainting, fever, nausea and local pain sometimes follow its use and some authorities consider that adult serum is preferable.

It should be remembered that after the injection of any human serum, jaundice is a possible sequel.

The most serious complication of measles is broncho-pneumonia, which is amenable to chemotherapy.

Measles may be associated with diphtheria, whooping-cough or even with scarlet fever, so throat swabs should be taken in suspicious cases and appropriate treatment given.

A case of measles first seen in the pyrexial stage is treated on ordinary lines, a diaphoretic mixture being given for the fever, boric acid lotion for the eyes, and a mouth wash for the mouth. Sulphadiazine should be given in the usual doses both in order to combat any concurrent infection such as tonsillitis and to ward off complications such as pneumonia.

The usual quarantine is three weeks and a patient is non-infective a fortnight after the appearance of the rash, provided that there is no complication and no nasal discharge.

MEDICO-LEGAL AND LUNACY

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**RULES FOR TRANSMISSION OF SUBSTANCES. FOR
ANALYSIS TO THE CHEMICAL EXAMINER AND
GOVERNMENT ANALYST, UNITED PROVINCES
AND CENTRAL PROVINCES**

RULES FOR MAGISTRATES

1. Substances ought not to be sent to the Chemical Examiner for analysis when there is neither a reasonable suspicion that poison has been used nor anything in the post-mortem examination of the body leading to such a supposition. Magistrates should limit their references to that officer to cases of necessity, in which the local medical officer cannot afford the information required.

2. Civil Surgeons and Superintendents of Police are to remember that the duty of making a reference to the Chemical Examiner, and of requiring that officer to make a report which shall be admissible under Section 510 of the Criminal Procedure Code, is one which lies solely within the province of the Magistrate conducting the inquiry for which information on the character of the suspected substance is required. Such references should not, under any circumstances, be made by them directly.

3. When, in the course of any proceeding under the Criminal Procedure Code, a Magistrate decides that a reference to the Chemical Examiner is necessary, he shall at once, in Form No. 1, call upon that officer for a report, and shall request the Civil Surgeon or officer in civil medical charge, by endorsement to Form No. 1, to forward to the Chemical Examiner the substance of which analysis is required. The Chemical Examiner will forward his report to the Magistrate in Form No. 5. He will also forward a duplicate of the report to the Civil Surgeon or officer in medical charge. In every case full details shall be given of the substance sent or received and of the case in which the reference is made, so that no question as to the identity of the article can be raised. If the Civil Surgeon can give a decided opinion regarding stains supposed to be those of blood, it is ordinarily unnecessary to refer to the Chemical Examiner, but the Magistrate may do so if he considers this course advisable.

4. The Chemical Examiner should be furnished, for his information and guidance, with every detail obtainable from both the medical officer and from deponents which will throw light on the case or afford him a clue. This information should be given in the annexure to Form No. 1. If a medical officer has seen the case, he should add any information he can give at the foot of this report. If further information is received in time to be useful, a supplementary report should be forwarded. It is important that substances supposed to contain poison should be analysed with as little delay as possible. When a reasonable suspicion exists that poison has been used in the commission of an offence, the substance supposed to contain the poison should be at once sent to the Chemical Examiner, even though the person who committed the offence may not at the time have been arrested.

5. In cases of analysis of portions of a dead body, besides a copy of the post-mortem report in the handwriting of a medical officer or medically-trained subordinate, the Chemical Examiner should be furnished with replies to the queries printed on the annexure to Form No. 1.

Chemical Examiner's Form No. 1.

No.....

From

THE .. MAGISTRATE OF.....

To

THE CHEMICAL EXAMINER,

United Provinces, Agra.

Dated.....19 ..

Case No.....

King-Emperor *versus*....., caste....., son of.....
of mauza police-station..... charged under
section, Indian Penal Code.

Sir,

I have the honour to advise you that the Civil Surgeon of this district has been instructed to forward to your address for analysis and report—

(1) Portions of viscera of....., caste....., son of... .., of mauza.....

(2) The following articles :—
and to request that you will apprise me of the result of your examination.
It is suspected that.....

I have the honour to be,

Sir,

Your most obedient servant,

.....

Magistrate.

No....., dated.....19 ..

Copy forwarded to the Civil Surgeon for favour of necessary action.

A—Information supplied by the Police in cases of suspected human poisoning —

- (1) Name, sex, and age of patient.
- (2) Nature of food last taken.
- (3) How soon after this meal did the symptoms of poisoning begin?
- (4) Did the patient walk from the place where first taken ill? If so, how far?
- (5) Did the patient complain of pain or discomfort?
- (6) Was there purging?
- (7) Was there vomiting?
- (8) Did the patient become unconscious? If so, how soon did this occur after the onset of the symptoms?
- (9) Was the patient dizzy or faint?
- (10) Did convulsions or cramps occur?
- (11) Was tingling of the skin of throat complained of?
- (12) Did the patient talk sensibly or foolishly?
- (13) Did the patient pick at objects on the ground or bed?
- (14) Was any treatment adopted? If so, what was its nature?
- (15) Did death occur, and, if so, how soon after the illness began?
- (16) What poison was supposed to have been used?

Signature of Police Official and Date.

Wherever possible, a report by a medical officer who has seen the case should be added, which should contain his opinion as to the nature of the poison used. Any information given by friends and neighbours should also be noted.

B.—Information supplied by the Police in case of suspected cattle-poisoning:

- (1) Species of animal and name of owner.
- (2) Nature of food last taken
- (3) How soon after this food did symptoms of illness appear?
- (4) Did the animal appear to be in pain?
- (5) Did purging occur?
- (6) Was there discharge from mouth or nostrils?
- (7) Were convulsions observed?
- (8) Did the animals appear to be unconscious; if so, how soon after the onset of the symptoms?
- (9) Is it suspected that the poison was administered by the mouth, rectum or hypodermically ("su" poisoning)?
- (10) Was any foreign matter present in the rectum?
- (11) Did death occur?

Signature of Police Official and Date.

Chemical Examiner's Form No. 5.

No.....

From

THE CHEMICAL EXAMINER,

United Provinces, Agra

To

THE...MAGISTRATE OF ..

Dated Agra, the... 19 ..

Case No.

King-Emperor *versus* .., caste. .., son of .., of mauza....., police-station .., charged under section .., Indian Penal Code.

Sir,

In reply to your No.., dated. .., I have the honour to intimate that I received, on the....., by....., a packet, the despatch of which was notified to me by the Civil Surgeon of .., in his No....., dated.....

The packet consisted of

The contents of the packet were as follows*:

The contents were duly examined by me with the result.....

I have the honour to be,

Sir,

Your most obedient servant,

.....

Chemical Examiner.

*Enter full details of the nature of the substances sent, with the name of deceased or owner or of the person from whose possession they were taken. Also state the mode of preservation (whether preserved in spirit or salt solution). In the case of viscera of an animal the name of the owner should be given; also the name of the village where he resides

Chemical Examiner's Form No. 9.

No.....

From

THE GOVERNMENT ANALYST,

United Provinces, Agra.

To

THE DISTRICT MAGISTRATE OF.....

Dated Agra, the.....19

Sir,

I have the honour to acknowledge the receipt of the undermentioned article, the despatch of which for analysis was intimated in your No..... dated . . ., and to report (on the reverse) the result of the analysis.

I have the honour to be,

Sir,

Your most obedient servant,

.....
Government Analyst, United Provinces.

Chemical Examiner's Form No. 10.

No

From

THE CHEMICAL EXAMINER,

United Provinces and Central Provinces.

To

THE DISTRICT MAGISTRATE OF.....

Dated Agra, the.....19 .

Sir,

With reference to your letter No....., dated....., I have the honour to advise despatch by { Postal parcel.....
Rail
.. containing..... returned to you after examination, as reported to you in this office No....., dated.....
Railway receipt herewith enclosed.

I have the honour to be,

Sir,

Your most obedient servant,

.....
Chemical Examiner to Governments,
United Provinces and Central Provinces.

RULES FOR CIVIL SURGEONS

A. GENERAL

1. Articles sent for examination should, as a rule, if under 10 seers in weight, be sent by registered post. If above this weight, they should be sent by rail (passenger train, freight pre-paid). In the latter case the railway receipt should be enclosed in the letter advising despatch of parcel.

2. In all cases a letter advising despatch of parcel must be sent to the Chemical Examiner. Chemical Examiner's Form No. 2 should be used for the letter, and it should be sent by post and not enclosed

in the parcel. The number and date of this forwarding letter must always be written on the outside of the parcel, preferably on the label.

3. Great care should be used in packing substances sent to the Chemical Examiner to avoid any risk of the parcel becoming offensive or dangerous to post office or railway officials. Such an accident would render the sender liable to prosecution under Section 61 of the Post Office (VI of 1898). The Chemical Examiner is directed to report the name of any officer who fails to comply with these instructions.

4. The duty of preparing and despatching the articles to be sent for analysis devolves on the Civil Surgeon or officer in civil medical charge. In all cases the parcel should be packed and sealed in the presence of the Civil Surgeon or other responsible medical officer. The cost of preparation, packing and postage or railway freight should be charged in the Magistrate's contingent bill. Despatching officers will be held personally responsible that the subjoined instructions are carefully followed.

5. If, in the opinion of the Civil Surgeon, the results of a post-mortem examination are such as to give reasonable grounds for suspecting poison to have been used, he should immediately communicate with the District Magistrate with a view to obtain authorization to send portions of the viscera to the Chemical Examiner. Such portions of the viscera should be despatched immediately this authorization has been obtained.

6. A declaration of the nature of the contents of the parcel to the post office or railway authorities is unnecessary and should not be made.

7. Remains of viscera sent for examination are preserved by the Chemical Examiner for a period of six months after receipt.

8. Articles belonging to separate cases must on no account be packed in the same box or parcel.

9. These rules apply equally whether the articles are sent by post or by rail.

B. DIRECTIONS FOR PRESERVING AND PACKING VISCERA AND OTHER ARTICLES

10. Special bottles for holding viscera, and boxes for holding these bottles are supplied by the Chemical Examiner. Serial numbers are etched into the glass both of the bottle and of the stopper. The boxes are also marked with serial numbers.

11. On receipt by the Chemical Examiner of a box from the Civil Surgeon, the viscera bottle or bottles will be at once taken out and replaced by an empty bottle or bottles. The box will then be returned to the Civil Surgeon by passenger train.

12. All bottles will be issued from the Chemical Examiner's office containing a sufficient quantity of rectified spirit. Motor grease will be placed on the stoppers to prevent their sticking. In case the bottles are used and cleaned in the Civil Surgeon's office, care

should be taken to treat the stoppers similarly with Vaseline or any other suitable grease.

13. The top of the box, which has a pent-roof shape, is not meant to be opened. The box is furnished with a door at the side, through which the bottle or bottles can be taken out and replaced. The box is lined with cushions which press against the bottle firmly on all sides, so that no further packing material is necessary.

14. The door of the box has a lock whose key will remain permanently in the possession of the Civil Surgeon. A duplicate key is kept in the Chemical Examiner's office. The key should therefore not be sent with the letter advising despatch of parcel.

15. A serial number is marked on each box and also on its key. This number should be quoted in the letter advising despatch of parcel.

16. After locking the door of the box a piece of tape is to be passed across the keyhole and sealed in position. Depressions in the wood near the keyhole are provided for the seal impressions. The special medico-legal seal should be used.

As this seal is of a large size it is apt to stick to the wax. To avoid this and to ensure a clear impression being obtained, the seal, before use, should be dusted over with powdered French chalk (*salem kharia*).

17. The address label (Chemical Examiner's Form No. 7) should be pasted (not gummed) to the door of the box in such a position as to cover the keyhole. On this label the number and date of the letter advising despatch should always be inserted to prevent mistakes in identification.

18. A label (Chemical Examiner's Form No. 6) will be pasted on to each bottle before issue from the Chemical Examiner's office. When the bottle is brought into use this label must be filled up (giving especially the name of the deceased, etc.) by the Civil Surgeon or other responsible medical officer. The number that is etched into the glass of the bottle should be copied on to the label.

19. The stopper should be securely tied in position by tape or string, or a piece of cellophane should be stretched over it and tied securely in position.

20. Chemical Examiner's Form No. 6 is a label that is intended to be attached to each bottle or other article sent to the Chemical Examiner. It should not be attached to the outside of any box or parcel, neither should it be sent in an envelope.

21. If orders are received by the Civil Surgeon to destroy viscera that have been placed in a bottle, a further supply of spirit must be obtained locally when the bottle again comes into use. The cost of this spirit will be met from the Magistrate's contingent bill. In such cases a sample of the spirit used must be sent to the Chemical Examiner in a small bottle, properly sealed and labelled. Should the spirit contain any sediment, care should be taken that some of this is sent in the sample bottle of spirit.

22. The quantity of the spirit used should be equal to that of the viscera in bulk. The viscera and spirit together should not fill the

bottle, but only reach to two-thirds of its height, in order to diminish the risk of the bottle bursting in case any gas is given off.

23. Spirit that has been denaturalized by the addition of caoutchoucine should not be used for preserving viscera.

24. The pieces of viscera sent should be slashed or cut into small pieces to ensure penetration of the spirit. The stomach should be cut open with a similar object.

25. In cases of suspected alcohol poisoning, spirit must not be used as a preservative. A saturated solution of common salt is to be employed. The salt should be dissolved in water, preferably with the aid of heat. A note to the effect that salt solution has been employed should be made in the letter to the Chemical Examiner advising despatch of the parcel. In such cases great care must be taken that the bottle employed does not contain any trace of spirit. It should be washed by repeatedly filling with water and emptying.

26. Before despatch each bottle is to be put into the cardboard case in which it was received from the Chemical Examiner. It should be noted that the number stencilled on the cardboard case is the same as that on the bottle.

27. The pieces of tape attached to the sides of the cardboard case should be brought together on the top of the cover of the cardboard case and sealed in position, using the special medico-legal seal. No knot should be made in the tape.

28. A piece of wide newar tape is attached by one end to the inside of the box near the hinge of the door. When putting the cardboard case into the box care should be taken that the free end of the newar tape encircles the case. By pulling the extremity of this tape the cardboard case can easily be taken out of the box.

29. The serial numbers of the viscera bottles used (which are etched into the glass of the bottle and of the stopper) should always be quoted in the letter advising despatch of parcel.

30. The special medico-legal seal that is issued to each Civil Surgeon and the keys of the boxes should be kept in a locked cupboard in the post-mortem room, and should never be allowed to come into the hands of unauthorized persons.

C. MATERIAL TO BE SENT

31. In human poisoning cases two bottles will be used, except in the case of infants, when one bottle will be sufficient. In the former alternative the stomach and contents are to be placed in one bottle. The other bottle will contain pieces of the liver, spleen, kidney and of the upper part of the small intestine. The quantity of viscera sent should be sufficient, when an equal amount of spirit has been added, to fill the bottle up to two-thirds of its height.

Note.—Any suspicious substance found in the stomach should be sent in a separate phial.

32. Faecal matter should not, as a rule, be sent for examination, unless poisoning by arsenic be suspected.

33. Vomit, if received in a moist condition, may be diluted with spirit and sent in a viscera bottle. If received in a dry state, it may be sent in the original package, after labelling, sealing and enclosing in a suitable box. Or it may be unpacked and placed, with a sufficiency of spirit, in a viscera bottle. The bottle may then be packed and despatched in accordance with the foregoing rules.

34. In abortion cases, besides the specimens of viscera ordinarily sent, portions of the generative organs should be despatched if considered advisable by the medical officer. Sticks or other foreign matter found in the generative organ should invariably be sent separately after removal, and drying, when practicable.

35. In ordinary cases of cattle poisoning one viscera bottle is sufficient. This should contain pieces of the stomach, liver, spleen, and intestine. In cases of suspected "sui" poisoning, or in cases in which death is supposed to have been caused by introduction of foreign bodies into the rectum, the injured parts only need be sent, together with any foreign bodies found. Such foreign bodies should be dried when practicable, and sent without any preservative, as the poisons used in these cases are likely to be harmed by the action of alcohol.

D. BLOOD AND SEMINAL STAINS

36. Articles of clothing, etc., having suspected blood or seminal stains should be thoroughly dried before being sent to the Civil Surgeon for transmission to the Chemical Examiner. Exposure to the open air for a couple of hours will be sufficient in dry weather. Drying before a fire may be necessary in the rains, but, when so doing, great care should be taken that the articles of clothing are not scorched. Unless the clothing is thoroughly dried, putrefaction is likely to set in and render recognition of the source of the stains either difficult or impossible. Civil Surgeons should open all parcels of clothing before despatch to see whether the above precaution has been taken. Further drying may then be carried out, if necessary, but it must be borne in mind that this precaution is useful before rather than after putrefaction has occurred.

If examination for gonococci in addition to spermatozoa be required in smears prepared from genital discharges, two additional films, exclusively for testing for gonococci, should be sent. The films should be forwarded unstained.

37. In both blood-stain and seminal-stain cases Chemical Examiner's Form No. 6 should be used as a label and attached to each article sent. In both classes of stains the whole of each garment—not cut-out pieces—should be despatched. In the case of blood stains on mud floors, earth, etc., the piece containing the suspected stain should be cut out and wrapped in cotton-wool, before packing in a box for transmission to the Chemical Examiner. (Special attention should be paid to this point, as a small blood stain, which

of itself may be quite easy to recognize, is no longer recognizable if shaken up with a quantity of loose earth.)

38. Clothing and other articles having suspected stains may either be packed in a box with suitable packing material, or they may be sewn up in a cloth parcel. In either case the package must be sealed with the medico-legal seal.

39. Clothes and other articles sent in blood-stain cases are to be returned to the District Magistrate after examination by the Chemical Examiner. Each article of clothing before return is to be marked by the Chemical Examiner with a special stamp showing date of examination.

E. MISCELLANEOUS

40. Weapons, food and other miscellaneous objects should be packed in boxes, over which a covering of *garah* cloth is to be sewn. Yellow wax cloth is liable to contain traces of arsenic, and therefore should not be used in packing substances sent in poisoning cases. Seal impressions are to be made along the seams of the cloth covering at distances not exceeding three inches. In cases in which any other than the prescribed medico-legal seal is used, a pattern of the impression of the seal should be sent to the Chemical Examiner. This pattern impression should be made in ink rather than in wax. The device on the seal must in no case be that of the current coin, or merely a series of straight, curved or crossed lines.

Food material in poison cases, if moist or liable to decomposition, should be sent preserved in alcohol.

41. For packing glass bottles the best material is thin wood-shavings, known commercially as "wood-wool". Dry grass or straw may also be used. Cotton-wool, though suitable for light articles, is quite unsuitable for packing heavy fragile bottles, etc. The packing material should be tightly pressed in, especially at the sides, so that there is no chance of the bottle coming in contact with any part of the inside of the box.

42. All officers requiring substances to be analysed, in which the quantities of constituents have to be determined, such as potable waters, should remember that such analyses take up a great deal of time, and therefore no needless analysis should be demanded. In such cases a certificate should be obtained from the Magistrate of the district that the analysis is absolutely necessary. Without this certificate the Government Analyst is empowered to decline undertaking quantitative analyses.

43. Any municipal board requiring an analysis to be made shall forward to the Government Analyst, with the letter asking for the analysis, the treasury officer's receipt for the prescribed fee of ten rupees for each article examined. (This rule does not apply to the routine analysis of water from water works, for which a special arrangement has been made.)

44. Analyses desired by the Military Department will be performed under sanction of the Director of Medical Services in India. In urgent cases the analysis should be carried out forthwith and sanction obtained later.

45. The results of analyses of substances other than those relating to criminal cases will be reported on Chemical Examiner's Form No. 9.

46. In the event of a viscera bottle being cracked or broken, it should be completely destroyed, in the presence of the Civil Surgeon. A certificate, that this has been done should be sent to the Chemical Examiner, who thereupon will issue another bottle in replacement.

Chemical Examiner's Form No. 2.

No.....

From

THE CIVIL SURGEON OF.....

To

THE CHEMICAL EXAMINER,

United Provinces, Agra.

Dated19 ..

Case No.....

King-Emperor *versus*....., caste....., son of.....,
of mauza , police-station....., charged under section
..... , Indian Penal Code.

Sir,

At the request of the.....Magistrate of this district, I have the honour to forward to you, by....., the following articles:—

(1) Portions of viscera of....., caste....., son of.....,
of mauza

The bottles containing the above are numbered.....and.....

The above bottles are enclosed in standard pattern boxes numbered.....

.....

(2) The undermentioned articles* :—
packed in a cloth-covered sealed box.

The above articles were packed and sealed in my presence, the prescribed medico-legal seal being used.

The railway receipt is herewith enclosed.

It is suspected that.....

I have the honour to be,

Sir,

Your most obedient servant,

.....

Civil Surgeon.

*Enter full details of the nature of the substances sent, with the name of the owner, or of the person from whose possession they were taken. Also state the mode of preservation (whether preserved in spirit or salt solution). In the case of viscera of an animal the name of the owner should be given; also the name of the village where he resides.

(Annexure to Chemical Examiner's Form No. 2)

Copy of the post-mortem report (the original being in the handwriting of a medical officer or trained subordinate).

Hospital.

Post-mortem examination of the body of, sex
 age about years Probable interval since death.....
 External appearances
 Odour at the mouth
 Head
 Condition of brain
 Lungs
 Heart
 Liver
 Spleen
 Stomach
 Mucous membrane of stomach
 Intestines
 Kidneys
 Bladder
 Womb
 Suspected cause of death.....

Civil Surgeon.

Note.—In cases of exhumation the dates of burial and exhumation should be given.

Chemical Examiner's Form No. 3.

No.....

From
 THE CHEMICAL EXAMINER,
 United Provinces, Agra.

To
 THE CIVIL SURGEON of.....

Dated Agra, the.....19 ..

Case No.....

King-Emperor *versus*....., caste....., son of.....
 of mauza....., police-station....., charged under section
 Indian Penal Code.

Has the honour to acknowledge receipt in good order of—

(1) Viscera boxes Nos.

(2) Sealed packet

of which despatch was notified in his No....., dated.....

Chemical Examiner, United Provinces.

Chemical Examiner's Form No. 4.

No.....

From

THE CHEMICAL EXAMINER,

United Provinces, Agra.

To

THE CIVIL SURGEON of.....

Dated Agra, the.....19 ..

Sir,

I have the honour to advise despatch by rail (railway receipt enclosed) of the viscera boxes referred to in your letter No..... dated the.....

The above boxes are numbered.....

They contain Viscera bottles numbered.....

The bottles have been cleaned in this office, and are issued containing a sufficient quantity of rectified spirit. They are enclosed in cardboard cases, and both these and the boxes are duly sealed with the special medico-legal seal of this office.

In acknowledging receipt of the above package you are requested to state that it has been opened in your presence and whether you have found the contents in good order and corresponding to the above description.

I have the honour to be,

Sir,

Your most obedient servant,

.....
Chemical Examiner,
United Provinces and Central Provinces.

Chemical Examiner's Form No. 6 (LABEL)

Article for Analysis.

Case No.....

King-Emperor *versus* caste son of.....
 of mauza police-station....., charged under section
 , Indian Penal Code

Number and date of letter advising despatch to Chemical Examiner.....

(Serial number of bottle to which this label is attached).....

Contents (in full detail, with name of deceased or name of owner or possessor of the article, in roman characters).....

Date of packing.....

.....
Civil Surgeon of.....

Chemical Examiner's Form No. 7 (LABEL).

Letter No..... Dated.....

Per Passenger Train, Freight Prepaid.

GLASS WITH CARE.

From

THE CIVIL SURGEON OF.....

To

THE CHEMICAL EXAMINER,

United Provinces and Central Provinces, Agra.

Chemical Examiner's Form No. 8 (LABEL).

Letter No....., Dated.. ..

By Passenger Train, Paid.

From

THE CHEMICAL EXAMINER,

United Provinces, Agra.

To

THE CIVIL SURGEON of.... ..

Despatched on.....

SECTIONS OF THE CRIMINAL PROCEDURE CODE (ACT V OF 1898) RELATING TO PUBLIC HEALTH AND MEDICO-LEGAL QUESTIONS

CHAPTER XIV

OFFENCES AFFECTING THE PUBLIC HEALTH

Section.	Offence.	Whether the Police may arrest without warrant or not.	Whether a warrant or a summons shall ordinarily issue in the first instance.	Whether bailable or not.	Whether compoundable or not.	Punishment under Indian Penal Code.	By what Court triable.
269	Negligently doing any act known to be likely to spread infection of any disease dangerous to life.	May arrest without warrant.	Summons.	Bailable.	Not compoundable.	Imprisonment of either description for 6 months or fine, or both.	Presidency Magistrate or Magistrate of the first or second class.
270	Malignantly doing any act known to be likely to spread infection of any disease dangerous to life.	Do. ..	Do. ..	Do. ..	Do. ..	Imprisonment of either description for 2 years or fine, or both.	Do. ..
271	Knowingly disobeying any quarantine rules.	Shall not arrest without warrant.	Do. ..	Do. ..	Do. ..	Imprisonment of either description for 6 months or fine, or both	Do.
272	Adulterating food or drink intended for sale, so as to make the same noxious.	Do. ..	Do. ..	Do. ..	Do. ..	Imprisonment of either description for 6 months or fine of Rs. 1,000, or both.	Do.

273	Selling any food or drink as food and drink knowing the same to be noxious.	Shall arrest without warrant.	Summons.	Bailable.	Not compoundable.	Imprisonment of either description for 6 months or fine of Rs. 1,000, or both.	Presidency Magistrate or Magistrate of the first or second class.
274	Adulterating any drug or medicinal preparation intended for sale so as to lessen its efficacy or to change its operation, or to make it noxious.	Do. ..	Do. .	Do. ..	Do	Do.	Do.
275	Offering for sale or issuing from a dispensary any drug or medicinal preparation known to have been adulterated.	Do .	Do. .	Do. .	Do ..	Do. ..	Do
276	Knowingly selling or issuing from a dispensary any drug or medicinal preparation as a different drug or medicinal preparation.	Do. ..	Do. ..	Do ..	Do. .	Do. ..	Do.
277	Defiling the water of a public spring or reservoir.	May arrest without warrant.	Do. ..	Do. ..	Do. ..	Imprisonment of either description for 3 months or fine of Rs. 500, or both.	Any Magistrate.
278	Making atmosphere noxious to health.	Shall arrest without warrant.	Do. ..	Do. ..	Do. ..	Fine of Rs. 500	Do.

CHAPTER XVI
OFFENCES AFFECTING THE HUMAN BODY
Of Offences Affecting Life

Offence	Whether the Police may arrest without warrant or not	Whether a warrant must be issued before the arrest	Whether punishable or not	Whether punishable or not	Punishment under Indian Penal Code	By what Court triable.
Section 302 Murder	Yes	Yes	Punishable	Punishable	Death or imprisonment for life, according to circumstances	Court of Sessions
Section 304 Murder by a person who has been convicted of a previous offence for life	Yes	Yes	Yes	Yes	Death	Do.
Section 305 Attempt to commit murder	Yes	Yes	Yes	Yes	Imprisonment for life, or imprisonment for a term not less than 10 years, and fine.	Do
Section 306 Abetment of suicide	Yes	Yes	Yes	Yes	Imprisonment of either description for 10 years or fine, or both	Do.

	May arrest without warrant.	Warrant.	Available.	Not com- pound- able.	Imprisonment of either description for 2 years or fine, or both.	Court of Sessions, presidency Magistrate or Magistrate of the first class.
304A Causing death by rash or negligent act.	Do. ..	Do. ..	Do. ..	Do. ..	Death or transporta- tion for life, or im- prisonment for 10 years, and fine.	Court of Sessions.
305 Abetment of suicide committed by a child or insane or delirious person or an idiot, or a person intoxicated.	Do. ..	Do. ..	Do. ..	Do. ..	Imprisonment of either description for 10 years, and fine.	Do.
306 Abetting the commission of suicide.	Do. ..	Do. ..	Do. ..	Do. ..	Do.	Do.
307 Attempt to murder .. If such act cause hurt to any person.	Do. ..	Do. ..	Do. ..	Do. ..	Transportation for life, or as above.	Do.
Attempt by life-convict to murder, if hurt is caused.	Do. ..	Do. ..	Do. ..	Do. ..	Death, or as above ..	Do.
308 Attempt to commit culp- able homicide.	Do. ..	Do. ..	Do. ..	Do. ..	Imprisonment of either description for 3 years or fine, or both.	Do.
If such act cause hurt to any person.	Do. ..	Do. ..	Do. ..	Do. ..	Imprisonment of either description for 7 years or fine, or both.	Do.
309 Attempt to commit suicide.	Do. ..	Do. ..	Do. ..	Do. ..	Simple imprisonment for one year or fine, or both.	Presidency Magistrate or Magistrate of the first or second class.

OFFENCES AFFECTING THE HUMAN BODY—(contd.)

Section.	Offence.	Whether the Police may arrest without warrant or not.	Whether a warrant or a summons shall ordinarily issue in the first instance.	Whether bailable or not.	Whether compoundable or not.	Punishment under Indian Penal Code.	By what Court triable.
311	Being a thug	May arrest without warrant.	Warrant.	Not bailable.	Not compoundable.	Imprisonment for life, and fine.	Court of Sessions.
312	Causing miscarriage ..	Shall not arrest without warrant.	Do. ..	Bailable.	Do. ..	Imprisonment of either description for 3 years, or fine, or both.	Do.
	If the woman be quick with child.	Do. ..	Do. ..	Do. ..	Do. ..	Imprisonment of either description for 7 years, and fine.	Do.
313	Causing miscarriage without woman's consent.	Do. ..	Do. ..	Not bailable.	Do. ..	Imprisonment for life, or imprisonment of either description for 10 years, and fine.	Do.
314	Death caused by an act done with intent to cause miscarriage.	Do. ..	Do. ..	Do. ..	Do. ..	Imprisonment of either description for 10 years, and fine.	Do.
	If act done without woman's consent.	Do. ..	Do. ..	Do. ..	Do. ..	Imprisonment for life, or as above.	Do.

315	Act done with intent to prevent a child being born alive, or to cause it to die after its birth.	Shall not arrest without warrant.	Do. ..	Warrant.	Do. ..	Not bailable.	Not compoundable.	Imprisonment of either description for 10 years, or fine, or both.	Court of Sessions.
316	Causing death of a quick unborn child by an act amounting to culpable homicide.	Do. ..	Do. ..	Do.	Do. ..	Do.	Do. ..	Imprisonment of either description for 10 years, and fine.	Do.
317	Exposure of a child under 12 years of age by parent or person having care of it with intention of wholly abandoning it.	May arrest without warrant.	Do. ..	Do.	Do. ..	Bailable.	Do.	Imprisonment of either description for 7 years or fine, or both.	Court of Sessions, Presidency Magistrate or Magistrate of the first class.
318	Concealment of birth by secret disposal of dead body.	Do. ..	Do. ..	Do.	Do. ..	Do.	Do. ..	Imprisonment of either description for 2 years or fine, or both.	Do.
323	Voluntarily causing hurt.	Shall not arrest without warrant.	Summons.	Do. ..	Do.	Do. ..	Compoundable.	Imprisonment of either description for 1 year, or fine of Rs. 1,000, or both.	Any Magistrate.
324	Voluntarily causing hurt by dangerous weapons or means.	May arrest without warrant.	Do. ..	Do.	Do.	Do.	Compoundable when permission is given by the court before which a prosecution is pending.	Imprisonment of either description for 3 years or fine, or both.	Court of Sessions, Presidency Magistrate or Magistrate of the first or second class.

OFFENCES AFFECTING THE HUMAN BODY—(contd.)

Offence.	Whether the Police may arrest without warrant or not.	Whether a warrant or a summons shall ordinarily issue in the first instance.	Whether bailable or not.	Whether compoundable or not.	Punishment under Indian Penal Code.	By what Court triable.
Section. 325 Voluntarily causing grievous hurt,	May arrest without warrant.	Summons.	Bailable.	Compoundable when permission is given by the court before a prosecution is pending.	Imprisonment of either description for 7 years, and fine.	Do.
326 Voluntarily causing grievous hurt by dangerous weapons or means.	Do. ..	Do. ..	Not bailable.	Not compoundable.	Imprisonment for life, or imprisonment of either description for 10 years, and fine.	Do.
327 Voluntarily causing hurt to extort property or a valuable security, or to constrain to do anything which is illegal or which may facilitate the commission of an offence.	Do. ..	Warrant.	Do. ..	Do. ..	Imprisonment of either description for 10 years, and fine.	Court of Sessions, Presidency Magistrate or Magistrate of the first class.
328 Administering stupefying drug with intent to cause hurt, etc.	Do. ..	Do. ..	Do. ..	Do. ..	Do.	Do.

329	Voluntarily causing grievous hurt to extort property or a valuable security, or to constrain to do anything which is illegal or which may facilitate the commission of an offence.	May arrest without warrant.	Warrant.	Not bailable.	Not compoundable.	Imprisonment for life, or imprisonment for 10 years, and fine.	Court of Sessions, Presidency Magistrate, or Magistrate of the first class.
330	Voluntarily causing hurt to extort confession or information, or to compel restoration of property, etc.	Do. ..	Do. ..	Bailable.	Do. ..	Imprisonment of either description for 7 years and fine.	Court of Sessions.
331	Voluntarily causing grievous hurt to extort confession or information or to compel restoration of property, etc.	Do. ..	Do. ..	Not bailable.	Do. ..	Imprisonment of either description for 10 years and fine.	Do.
332	Voluntarily causing hurt to deter public servant from his duty.	Do. ..	Do. ..	Bailable.	Do. ..	Imprisonment of either description for 3 years, or fine, or both.	Court of Sessions, Presidency Magistrate or Magistrate of the first class.
333	Voluntarily causing grievous hurt to deter public servant from his duty.	Do. ..	Do. ..	Not bailable.	Do. ..	Imprisonment of either description for 10 years and fine.	Court of Sessions.

OFFENCES AFFECTING THE HUMAN BODY—(contd.)

Section.	Offence	Whether the Police may arrest without warrant or not.	Whether a warrant or a summons shall ordinarily issue in the first instance.	Whether bailable or not.	Whether compoundable or not.	Punishment under Indian Penal Code.	By what Court triable.
334	Voluntarily causing hurt on grave and sudden provocation, not intending to hurt any other than the person who gave the provocation.	Shall not arrest without warrant.	Summons.	Bailable.	Compoundable.	Imprisonment of either description for 1 month, or fine of Rs. 500, or both.	Any Magistrate.
335	Causing grievous hurt on grave and sudden provocation, not intending to hurt any other than the person who gave the provocation.	May arrest without warrant.	Do. ..	Do. ..	Compoundable when permission is given by the court before which a prosecution is pending.	Imprisonment of either description for 4 years, or fine of Rs. 2,000, or both.	Court of Sessions, Presidency Magistrate or Magistrate of the first or second class.
336	Doing any act which endangers human life or the personal safety of others.	Do. ..	Do. ..	Do. ..	Not compoundable.	Imprisonment of either description for 3 months, or fine of Rs. 250, or both.	Any Magistrate.

337 Causing hurt by an act which endangers human life, etc.	May arrest without warrant.	Summons.	Bailable.	Compoundable when permission is given by the court before which a prosecution is pending.	Imprisonment of either description for 6 months, or fine of Rs. 500, or both.	Presidency Magistrate or Magistrate of the first or second class.
338 Causing grievous hurt by an act which endangers human life, etc.	Do.	..	Do.	..	Imprisonment of either description for 2 years, or fine of Rs. 1,000, or both.	Do.

DANGEROUS WEAPON

(DEFINITION)

Any instrument for shooting, stabbing, or cutting, or any instrument which, used as a weapon of offence, is likely to cause death.

GRIEVOUS HURT

(DEFINITION)

1. Emasculation.
2. Permanent privation of the sight of either eye.
3. Permanent privation of the hearing of either ear.
4. Privation of any member or joint.
5. Destruction or permanent impairing of the powers of any member or joint.
6. Permanent disfiguration of head or face.
7. Fracture or dislocation of a bone or tooth.
8. Any hurt which endangers life, or which causes the sufferer to be, during the space of twenty days, in severe bodily pain, or unable to follow his ordinary pursuits.

DYING DECLARATION

The Assistant or Sub-Assistant Surgeon, in the absence of a Deputy Collector, Tehsildar, or Honorary Magistrate, should record the declaration himself. As regards the Police, the Medical Officer should inform them that the declaration is to be taken, and every facility should be given to enable them to be present, but, ordinarily, the declaration should not be recorded by a Police Officer. If it is impossible for the person making the declaration to write it, it should be recorded in the identical words, uttered by the dying man in his own vernacular; and on no account should any leading questions or suggestions be made, or anything added. Finally, it should be read over to him, and, if possible, signed by him, then signed by the writer and two witnesses. It should then be placed in a sealed envelope and forwarded direct to the Magistrate who will investigate the case.

DEATH CERTIFICATE

This should give the names of the deceased in full, and in addition to stating definitely the exact cause of death, should give the time, date and place. A doctor should, strictly speaking, never give a death certificate until he has viewed the body, although he has been attending the case up to the time of death. In all cases of accident, sudden and unexpected death, the medical man should never grant a certificate, unless he can conscientiously certify the true cause of death, and in all doubtful cases, should talk the facts over with the District Magistrate.

The Bengal Medical Act, 1914, Section 30, lays down that no Death Certificate is valid unless the practitioner or officer granting it is registered under the Act or under the Medical Acts.

INQUEST

In the Presidency towns there are Coroners, but elsewhere the District and Sub-Divisional Magistrates are *ex-officio* Coroners but, as a matter of fact, the enquiry is usually conducted by the Police, in correspondence with the Civil Surgeon. The Coroner is supposed to make the enquiry with a jury of 5, 7, 9, 11, 13 or 15 in number, and has the power to order the post-mortem examination or exhumation of a body and to commit to the sessions direct. But the usual procedure is for the evidence given on oath, and recorded in writing, to be submitted to a Magistrate's Court for trial in the usual way. (The Coroner's Act IV of 1871.)

HOW TO MAKE A POST-MORTEM EXAMINATION

1. IDENTIFICATION

The Police Officer who presents the written request for a post-mortem examination, must invariably be required to enter the mortuary with the Examiner and identify the body as that on which the examination is requested.

2. EXTERNAL EXAMINATION

A most careful examination must be made from the vertex to the feet, no detail being too trivial for notice, the points being entered under abrasions, bruises, nail marks, burns, wounds, gunshot wounds, fractures and dislocations.

In gunshot wounds, look for marks of powder grains. In cases of suspected poisoning, look for marks about the mouth. Think of marks suggestive of a hypodermic syringe having been used. Think of yourself in the witness-box, and remember it is as important to note their absence as their presence, and that you will be required to explain fully as to the evidence of or absence of a struggle, etc.

3. INTERNAL EXAMINATION

The cranial cavity should be examined first.

An incision is made from ear to ear over the vertex, and the scalp is reflected in two flaps, one forwards, the other backwards. The skull is sawn through an inch above the orbits in front, and the level of the occipital protuberance behind. The skull cap is raised from before backwards without using the chisel. The dura mater having been divided, and reflected on either side, the brain is removed, placed base downwards and sliced horizontally from above downwards, and finally, the dura mater is stripped from the skull.

The body is now opened by an incision from the chin to the pubes, care being taken that this incision does not involve any wound, or the umbilicus in infants, and the relations of skin, subcutaneous tissue and viscera are disturbed as little as possible. This incision opens the abdomen. Reflect the skin and subcutaneous tissue over the thorax to a point beyond the junction of the ribs with the cartilages. Divide the cartilages as far from the sternum as possible, but not the sterno-clavicular joints, and draw the sternum forcibly upwards until it fractures. Open the pericardium. Oper

the cavities of the heart, and remove the heart and lungs together. Separate the heart and examine arterial orifices. Make a long incision into each lung.

Separate the soft parts from the inside of the lower jaw, cutting close to the bone. Pull the tongue forwards below the chin, dissect back separating the pharynx and oesophagus with the larynx and trachea from the spine. Open larynx, trachea and oesophagus.

ABDOMEN.—Examine the abdominal viscera, generally *in situ*. Next examine the particular organ which is thought to be connected with the cause of death. The stomach is removed between two ligatures on the oesophageal and two on the duodenal end, and the contents kept for analysis.

LIVER.—Remove and note its weight, appearance on section, and the condition of the gall-bladder.

SPLEEN.—Note size, consistence, weight and appearance on section.

KIDNEY.—Weight; condition of capsule.

BLADDER.—Open and take a specimen of urine for analysis.

LARGE INTESTINE.—Remove between ligatures, open and examine, and preserve contents.

SMALL INTESTINE.—Remove between ligatures, open, examine, and preserve contents.

In women, examine vagina, uterus, and ovaries.

SPINE AND SPINAL CORD.—In the infrequent cases when this examination is necessary it should always be done last.

Note.—1. In those cases in which there is any reason to suspect poisoning, the viscera should be preserved in accordance with the rules laid down for the despatch of substances to the Chemical Examiner. See p. 530.

2. The points of the examination must always be written down at the time, the report being subsequently drawn up from the notes, giving facts first, then inferences.

3. No opinion should be given as to the cause of death, unless fully borne out by the appearances observed.

4. Never be satisfied with less than a complete examination of the three great cavities, and all the organs contained therein.

5. It is never too late to make a necropsy, no matter how much the body is decomposed.

6. Digestion does not go on to any extent after death, so that food may be found in the stomach several days later.

AVERAGE WEIGHTS AND MEASUREMENTS OF ADULT HUMAN ORGANS

BRAIN.—Weight: Male 49½ oz., Female 44 oz.

HEART.—Weight: Male 11 oz., Female 9 oz.

Measurements: 5 in. long, 3½ in. broad, 2½ in. thick at the thickest portion.

KIDNEY.—Weight: 5 oz.

Measurements: 4½ in. long, 2½ in. broad, 1½ in. thick.

LIVER.—Weight: 45–60 oz.

Measurements: From right to left, 7–10 in.

From before backwards, 3–6 in.

From above downwards, in the thickest part of the right lobe, 6–7 in.

LUNGS.—Weight: Right 22 oz., Left 20 oz.; very variable.

PANCREAS.—Weight: 3 oz.

Measurements: 6–8 in. long, $1\frac{1}{2}$ in. broad, $\frac{1}{2}$ –1 in. thick.

SPLEEN.—Weight: 5–7 oz.

Measurements: 5–6 in. long, 3–4 in. broad, 1– $1\frac{1}{2}$ in. thick.

STOMACH.—Weight: $4\frac{1}{2}$ oz.; capacity about 5 pints.

Measurements: 12 in. long, 4–5 in. broad.

NOTES ON GIVING EVIDENCE

In the witness-box your evidence is taken as follows:

A. EXAMINATION-IN-CHIEF.—This is made by the Counsel on the side for which you are giving evidence. He knows the nature of your evidence from his brief, and it is his object to get a clear statement of the facts from you.

B. CROSS-EXAMINATION.—This is made by the Counsel of the opposite side, with the object, if possible, of discrediting your statements.

C. RE-EXAMINATION.—This is made by the Counsel on the side for which you are giving evidence, with the object of combating any points which opposing Counsel may have made by your cross-examination, but no new questions or matter may be introduced.

1. The first essential is always to be prepared on all branches of the subject.

2. Keep control of your temper, and meet the adverse Counsel with good humour.

3. Speak clearly and slowly, using simple language without technical terms, avoid superlatives, and show, by your answers, that your only desire is to tell the truth.

4. Be exact and brief, giving definite measurements, time, place, date, etc. State facts only—not opinions, unless asked to do so.

5. Be extremely careful not to depart inadvertently from absolute accuracy; this may arise from a fit of nervousness, undue confidence or carelessness.

6. Never attempt to answer any question that you do not clearly understand.

7. Appeal to the Judge if you consider any question unfair.

8. Counsel, through lack of scientific knowledge, sometimes ask meaningless questions; at the same time these questions have to be answered, and it is frequently very difficult to do so, especially when Counsel sees you hesitate and presses the point.

The best course then is to endeavour to turn the matter. For example, if the question is on the spine, say: "Does your question refer to the spinal column or the spinal cord?" He has no knowledge

of the medical difference between the two, and usually promptly drops the point.

9. **BOOKS AND NOTES IN COURT.**—You are not supposed to quote from any book, the author of which is alive, on the principle that all evidence should be oral.

Your notes, which should have been made at the time, cannot be read out to the Court as evidence, but may be taken into Court to refresh your memory.

Should, however, Counsel of the opposite side see you referring to these notes in the witness-box, he can claim them and, with consent of the Judge, read them out to the Court; this may put you in a difficult position.

10. **PROFESSIONAL SECRETS.**—On this much-discussed question, the best plan is to appeal to the Judge for a ruling, claiming privilege. If the Judge decides that you must speak, you then divulge the secret only under compulsion of the law. If a witness still refuses to speak, he is liable to be committed for contempt of Court.

RULES FOR ADMISSION TO, OR DISCHARGE OF LUNATICS FROM, MENTAL HOSPITALS

BRIEF SUMMARY

ADMISSION INTO A MENTAL HOSPITAL

1. On a petition from the patient himself.
2. Reception Order from the Magistrate, on the petition of relatives or others.

3. (a) Any European, subject to the terms of the Army Act, can be admitted on an order signed by an administrative Medical Officer.

(b) Every officer in charge of a Police Station may arrest any wandering or dangerous lunatic.

(c) The Magistrate, on a medical certificate, can give a Reception Order for the admission of any lunatic not properly cared for or controlled, or who, he has reason to believe, is being cruelly treated.

(d) The Magistrate may authorize the detention of an alleged lunatic, in suitable custody, under medical observation, for a period of ten days. Under certain conditions this period may be extended to a maximum of thirty days.

DISCHARGE OF LUNATICS

1. A patient admitted on his own application, cannot be detained for more than twenty-four hours, after he has given notice in writing.

2. **Non-Criminal Lunatics:**

(a) The patient being cured, is discharged under Section 31 of the Act.

(b) The patient not being sane, but not being dangerous or aggressive, on the undertaking of a relative, can be discharged under Section 33 of the Act, security being taken from the relatives by the District Magistrate.

3. Criminal Lunatics are of three classes: A, B and C.

A.—Those who are unable to stand their trial, as their mental condition renders them unfit to make their defence.

B.—Those who have become sane, stood their trial, but were found to have committed the crime when insane.

C.—Persons who have become insane, while undergoing a term of imprisonment in jail.

CLASS A are kept until fit to stand their trial, or a report is made that they are never likely to be fit.

CLASS B are detained in the asylum if the crime is against the person, for four years; or six years in the case of the form of insanity being melancholia. On the expiration of this period, they are discharged if sane, or sent to the Non-Criminal Section if still insane. In the case of crimes not against the person, the period of detention is usually considerably less.

CLASS C patients are returned to jail on recovery. If recovery does not take place, they are transferred to the Non-Criminal Section of the asylum on expiration of their sentence.

TRANSFER OF LUNATICS TO ENGLAND

This is always a matter of difficulty, as few steamer companies are willing to take them. If the patient be a Government servant, or his family is domiciled in England, the Government will generally arrange a passage by troopship, application for which should be made through the Local Government.

The Indian law of lunacy does not hold in England, and it is therefore useless to send a medical certificate with the case, but a written statement should be sent. The patient is discharged from an Indian asylum under Section 33 of the Act, but on arrival at the end of the voyage, he must be seen and certified by two registered medical practitioners, and a Reception Order obtained from a Sheriff or Magistrate, before the patient can be admitted into any British asylum.

Attention is also invited to Para. 1063, Manual of Government Orders.

LAW RELATING TO THE ADMISSION, DETENTION AND DISCHARGE OF LUNATICS IN INDIAN MENTAL HOSPITALS (INDIAN LUNACY ACT, 1912)

As Amended by Act of 1922, Acts XI, XXXII and XXXIII of 1923, Act V of 1926, and Act X of 1927.

ADMISSIONS AND DETENTIONS

Under the provisions of Section 4, no person other than a criminal lunatic, or a lunatic so found by inquisition, shall be received or detained in any asylum without a Reception Order, save as provided by Sections 8, 16 and 98:

Provided any person in charge of an asylum may, with the consent of two of the visitors of such asylum, which consent shall not be

of the medical difference between the two, and usually promptly drops the point.

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Provided any person in charge of an asylum may, with the consent of two of the visitors of such asylum, which consent shall not be

given except upon a written application from the intending boarder, receive and lodge as a boarder in such asylum any person who is desirous of submitting himself to treatment.

A boarder received in an asylum under the proviso above noted shall not be detained in the asylum for more than twenty-four hours after he has given to the person in charge of the asylum notice in writing of his desire to leave such asylum.

APPLICATION FOR RECEPTION ORDER

Under the provisions of Section 5 an application for a Reception Order shall be made by a petition accompanied by a statement of particulars to the Magistrate within the local limits of whose jurisdiction the alleged lunatic ordinarily resides, shall be in the form prescribed and shall be supported by two medical certificates on separate sheets of paper, one of which certification shall be from a Medical Officer.

If either of the medical certificates is signed by any relative, partner or assistant of the lunatic or of the petitioner, the petition shall state the fact, and, where the person signing is a relative, the exact manner in which he is related to the lunatic or petitioner.

The petition shall also state whether any previous application has been presented for an enquiry into the mental capacity of the alleged lunatic in any court; and if such application has been made, a certified copy of the order made thereon shall be attached to the petition.

No application for a Reception Order shall be entertained in any area outside the Presidency towns unless the Local Government has, by notification in the local official Gazette, declared such area as an area in which Reception Orders may be made.

No Reception Order shall continue to have effect:

- (a) After the expiry of 30 days from the date on which it was made, unless the lunatic has been admitted to the place mentioned therein within that period, or
- (b) After the discharge, under the provision of this Act, of the lunatic from such place or from any asylum to which he may have been removed.

APPLICATION: BY WHOM TO BE PRESENTED

In accordance with the provisions of Section 6 the petition shall be presented, if possible, by:

- (a) the husband or wife of the alleged lunatic, or
- (b) by any other relative of the lunatic.

If the petition is not so presented, it shall contain a statement of the reasons why it is not so presented, and of the connection of the petitioner with the alleged lunatic and the circumstances under which he presents the petition.

No person shall present a petition unless he has attained the age of majority as determined by law to which he is subject, and has,

within fourteen days before the presentation of the petition, personally seen the said lunatic.

The petition shall be signed and verified by the petitioner, and the statement of the prescribed particulars by the person making such statement.

PROCEDURE UPON PETITION FOR RECEPTION ORDER

In accordance with the provisions of Section 7, upon the presentation of a petition the Magistrate shall consider the allegations in the petition and the evidence of lunacy in the medical certificates.

If he sees grounds for proceeding further, he shall personally examine the lunatic unless, for reasons to be recorded in writing, he thinks it unnecessary so to do.

If he is satisfied, he may make an order for the reception of the lunatic; but if he is not satisfied, he may fix any other date for considering the petition, notice of which shall be given to the petitioner and to any other person to whom such notice, in the opinion of the Magistrate, should be given.

DETENTION OF ALLEGED LUNATIC PENDING ENQUIRY

As provided in Section 8, pending the conclusion of the enquiry into the allegations, etc., in the petition referred to in preceding paragraph, the Magistrate may make such order as he thinks fit for the suitable custody of the lunatic.

CONSIDERATION OF PETITION

In accordance with the provisions of Section 9 the petition shall be considered in private in the presence of the petitioner, the lunatic (unless the Magistrate in his discretion directs otherwise), any representative of the lunatic and such other persons as the Magistrate thinks fit.

ORDER

As provided in Section 10, after considering the petition referred to in the previous paragraphs, the Magistrate may either make a Reception Order or dismiss the petition or may fix another date for further enquiry or evidences, and may state the source from which the cost of the lunatic's maintenance should be met. If the petition is dismissed, a copy of the recorded grounds for its dismissal shall be delivered to the petitioner.

FURTHER PROVISION AS TO RECEPTION ORDERS ON PETITION

As provided in Section 11, no Reception Order shall be made under Section 7 or Section 10 of the Act, save in the case of a lunatic who is dangerous and unfit to be at large unless—

- (a) the Magistrate is satisfied that the person in charge of the asylum is willing to receive the lunatic, and
- (b) the petitioner or some other person satisfies the Magistrate, in a written engagement, that he will pay the cost of the lunatic's maintenance.

RECEPTION ORDER IN CASE OF LUNATICS FROM FOREIGN STATES IN INDIA

1. As provided in Section 11A (1), when an arrangement has been made with any foreign European State with respect to the reception of lunatics in asylums in British India, the Governor-General in Council may, by notification in the *Gazette of India*, direct that a Reception Order may be made under this Act in the case of any lunatic, or class of lunatics, residing in the territories in India of such foreign European State, and shall in such notification specify the province or provinces within which such Reception Orders may be made.

2. On publication of a notification under the preceding paragraph, the provisions of the Lunacy Act, as to the making of Reception Orders on petitions and for temporary detention in suitable custody, shall apply, in the case of such lunatics with the following modifications, namely—

- (a) an application for a Reception Order may be made by petition presented by such officer or agent of the foreign State in which the alleged lunatic ordinarily resides, as may, by general or special order, be approved by the Local Government in this behalf;
- (b) the functions of the Magistrate shall be performed by such officer as the Local Government may, by general or special order, appoint in this behalf, and such officer shall be deemed to be the Magistrate having jurisdiction over the alleged lunatic for all the purposes of the said provisions;
- (c) for the purposes of Sections 5 and 18 (1) (Act IV of 1912), the expressions "Medical Officer" and "Medical Practitioner" shall include such persons or class of persons as the Local Government may specify in this behalf;
- (d) the Magistrate may in his discretion extend the period prescribed by Section 19 (Act IV of 1912), within which the alleged lunatic must have been medically examined; and
- (e) Sections 6 (1), (2), (3), 11 and 34 of the Act (Act IV of 1920) shall not apply.

and with such other modifications, restrictions or adaptations as the Governor-General in Council may, by notification in the *Gazette of India*, direct for the purpose of facilitating the application of the said provisions.

3. A Reception Order made under this paragraph shall be deemed to be a Reception Order made under Section 7 or Section 10 (Act IV of 1912), as the case may be.

RECEPTION ORDER IN CASE OF LUNATIC SOLDIER (44 & 45 VICT., C. 58)

Under the provisions of Section 12, when any European who is subject to the provisions of the Army Act has been declared a lunatic in accordance with the provisions of the Military Regulations

in force for the time being, and it appears to any administrative medical officer that he should be removed to an asylum, such administrative medical officer may, if he thinks fit, make a Reception Order under his hand for the admission of the said lunatic into an asylum which has been duly authorized for the purpose by the Governor-General in Council.

**POWERS AND DUTIES OF THE POLICE IN RESPECT OF WANDERING
OR DANGEROUS LUNATICS AND LUNATICS CRUELLY TREATED,
OR NOT UNDER PROPER CARE AND CONTROL**

In accordance with the provisions of Section 13, every officer in charge of a Police Station may arrest, or cause to be arrested, all persons found wandering at large within the limits of his station whom he has reason to believe to be lunatics and shall arrest, or cause to be arrested, all persons within the limits of his station whom he has reason to believe to be dangerous by reason of lunacy. Any person so arrested shall be taken forthwith before the Magistrate.

Every officer in charge of a Police Station who has reason to believe that any person within the limits of his station is deemed to be a lunatic and is not under proper care and control, or is cruelly treated or neglected by any relative or other person having the charge of him, shall immediately report the fact to the Magistrate.

**RECEPTION ORDER IN CASE OF WANDERING AND
DANGEROUS LUNATICS**

As provided in Section 14, whenever any person is brought before a Magistrate under the provision of Sub-section (1) of Section 13, the Magistrate shall examine such person, and if he thinks that there are grounds for proceeding further, shall cause him to be examined by a medical officer and may make such other enquiries as he thinks fit; and if the Magistrate is satisfied that such person is a lunatic and a proper person to be detained, he may, if the medical officer who has examined such person gives a medical certificate with regard to such person, make a Reception Order for the admission of such lunatic into an asylum.

Provided that, if any friend or relative desires that the lunatic be sent to a licensed asylum and engages in writing to the satisfaction of the Magistrate to pay the cost of maintenance of the lunatic in such asylum, the Magistrate shall, if the person in charge of such asylum consents, make a Reception Order for the admission of the lunatic into the licensed asylum mentioned in the engagement.

Provided, further, that if any friend or relative of the lunatic enters into a bond, with or without sureties, for such sum of money as the Magistrate thinks fit, on condition that such lunatic shall be properly taken care of and shall be prevented from doing injury to himself or to others, the Magistrate, instead of making a Reception Order, may, if he thinks fit, make him over to the care of such friend or relative.

ORDER IN CASE OF LUNATIC CRUELLY TREATED, OR NOT UNDER PROPER CARE AND CONTROL

In accordance with the provisions of Section 15, if it appears to a Magistrate, on the report of a Police Officer or the information of any other person within the limits of his jurisdiction that a person deemed to be a lunatic is not under proper care and control, or is cruelly treated or neglected by any relative or other person having the charge of him, the Magistrate may cause the alleged lunatic to be produced before him and summon such relative or other person as has or ought to have charge of him.

AMENDING ACT XXXIII OF 1923

Amends the Indian Army Act, 1911, and the Indian Lunacy Act, 1912, to include the Air Force and other additions to the Indian Lunacy Act of 1912.

AMENDING ACT V OF 1926

Deals with the relationship of the person making the petition to the Lunatic, and the duties and responsibilities of the petitioner.

AMENDING ACT X OF 1927

Amends the Indian Lunacy Act, 1912, to include the Air Force.

DISCHARGE OF LUNATICS

ORDER OF DISCHARGE FROM ASYLUM BY VISITORS

Under the provisions of Section 31 three of the visitors of the Asylum (of whom one shall be a medical officer) may, by order in writing, direct the discharge of any person detained in such asylum and such person shall thereupon be discharged:

Provided that no such order is made in the case of persons detained under Section 12 or in the case of criminal lunatics otherwise than as provided by Section 30 of the Prisoners Act of 1900.

When such order is made, if the person is detained under the order of any public authority, notice of the order of discharge shall be immediately communicated to such authority.

DISCHARGE OF LUNATICS IN OTHER CASES AND OF EUROPEAN MILITARY LUNATICS

As provided in Section 32, a lunatic detained in the asylum under a Reception Order made on the petition shall be discharged if the person on whose petition the Reception Order was made so applies in writing to the person in charge of the asylum.

Provided that no lunatics shall be discharged if the officer in charge of the asylum certifies in writing that the lunatic is dangerous and unfit to be at large.

A person detained in the asylum under a Reception Order made under Section 12 shall be detained therein until he is discharged therefrom in accordance with the military regulations in force for

the time being, or until the officer making the order applies for his transfer to the military authorities with a view to his removal to England. But if it appears to the officer in charge of the asylum that the discharge of the lunatic soldier is necessary either on account of his recovery or for any other purpose, such person shall be brought before the visitors. On the visitors recording their opinion that the discharge should be made, the General or other Officer Commanding the Division, District, Brigade, or Force, or other Officer authorized to order the admission of such person into the asylum, shall forthwith direct him to be discharged; and such discharge shall take place in accordance with the military regulations in force for the time being.

ORDER OF DISCHARGE ON UNDERTAKING OF THE RELATIVE FOR DUE CARE OF THE LUNATIC

In accordance with the provisions of Section 33, when any relative, etc., of a lunatic detained under Section 14, 15 or 17 desires that such lunatic shall be delivered to his care and custody, he may make application to the authority under whose order the lunatic is detained. If such authority, in consultation with the person in charge of the asylum and visitors (one of whom should be a medical officer), thinks fit and if such relative, etc., enters into a bond, with or without sureties, for such sum of money as the said authority deems suitable, that such lunatic shall be properly taken care of and shall be prevented from doing injury to himself or to others, he may make an Order for the discharge of such lunatic.

DISCHARGE OF PERSONS SUBSEQUENTLY FOUND ON INQUISITION NOT TO BE OF UNSOUND MIND

As provided in Section 34, if any lunatic detained in the asylum on a Reception Order made under Sections 7, 10, 14, 15 or 17 is subsequently found on an inquisition under Chapter IV or V of the Act, not to be of unsound mind and incapable of managing himself and his affairs, the person in charge of the asylum shall forthwith, on the production of a certified copy of such finding, discharge the alleged lunatic from the asylum.

All documents received with patients shall be returned on their death or discharge to the committing Magistrate or Courts, except in cases of military insanes, when they will be forwarded to the Staff Officer of the district.

LIST OF MENTAL HOSPITALS IN INDIA

BENGAL—

- (1) Mental Observation Ward, Bhowanipore, Calcutta.
- (2) Mental Ward of the Albert Victor Leper Hospital, Gobra, Calcutta.
- (3) Mental cases from this province are treated in the Indian Mental Hospital, Kanke (B. & O.).

BOMBAY—

- (1) Central Mental Hospital, Yerayda.
- (2) N.M. Mental Hospital, Nau-pada, Thana.
- (3) Mental Hospital, Ahmedabad.
- (4) Mental Hospital, Dharwar.
- (5) Mental Hospital, Ratnagiri.
- (6) Mental Hospital, Hyderabad (Sind).

LIST OF MENTAL HOSPITALS IN INDIA—*continued*

MADRAS—

- (1) Govt. Mental Hospital, Madras.
- (2) Govt. Mental Hospital, Calicut.
- (3) Govt. Mental Hospital, Waltair.

UNITED PROVINCES—

- (1) Mental Hospital, Agra.
- (2) Mental Hospital, Benares.
- (3) Mental Hospital, Bareilly.

PUNJAB—

Punjab Mental Hospital, Lahore.

BIHAR AND ORISSA—

- (1) Ranchi European Mental Hospital
- (2) Ranchi Indian Mental Hospital, Kanke

CENTRAL PROVINCES—

Nagpur Mental Hospital.

BURMA—

- (1) Mental Hospital, Minbu.
- (2) Mental Hospital, Tadagale, near Rangoon.

ASSAM—

Mental Hospital, Tezpur.

CENTRAL INDIA—

Mental Hospital, Indore City, Indore State.

MYSORE STATE—

Mental Hospital, Bangalore.

HYDERABAD STATE—

Mental Ward of the Central Jail, Hyderabad (Deccan).

CEYLON—

Colombo (Admits Europeans, Singhalese and Indians.)

Central Asylums have mental experts as whole-time superintendents, other Asylums are collateral charges generally held by the Civil Surgeon.

The European patients of the Punjab, United Provinces, Bihar and Orissa, the Central Provinces, Bengal and Assam are now sent to the new European Asylum at Ranchi in accordance with Government of India, Home Department Order, No. 86-Medical, dated 16th April, 1918.

MÉNÏÈRE'S DISEASE—See Ear, Diseases of.

MENINGITIS

CEREBROSPINAL MENINGITIS.—The advent of sulphapyridine (M. & B. 693) completely changed the treatment and prognosis of this disease.

DIAGNOSIS.—This may be missed at the beginning of an epidemic because the doctor does not think of it. In all cases of unexplained fever, therefore, examine the back of the neck for rigidity and the legs for Kernig's sign, which is present if a normal straight leg cannot be flexed to a right angle with the body. If suspicion is aroused, do a lumbar puncture. Typically, the fluid is under pressure and abounds with leucocytes containing the Gram-negative intracellular diplococci of Weichselbaum.

TREATMENT.—As soon as diagnosis is made, give six tablets of sulphathiazole or sulphadiazine, followed by two tablets three-hourly. On the second day and subsequent four days give two tablets three-hourly or four-hourly, depending upon the patient's condition. If the patient is unconscious give the soluble preparations intravenously in full doses. Eight days' treatment usually cures. To prevent "sulpha-kidney" give at least six pints of water each 24 hours, and more than this if the weather is hot.

In severe cases penicillin, 25,000 units intrathecally, may be given once every 24 hours in addition to the sulpha drugs.

Contacts should be isolated for six days and patients for fourteen; during convalescence, swabs should be taken from the nose to eliminate carriers. Overcrowding should be avoided in the affected area.

Pneumococcal Meningitis may occur in the course of pneumococcal empyema, by direct spread from a suppurating ear, or less commonly, during or after an attack of pneumonia.

Symptoms and treatment are as for cerebrospinal meningitis.

Other pyogenic organisms, such as the staphylococcus, streptococcus, gonococcus or anthrax bacillus may obtain access to the meninges either from the blood, from a neighbouring wound or inflamed area, generally in the ear, scalp, face or eye. Chemotherapy is again indicated, penicillin being specific for anthrax.

Influenzal Meningitis occurs and may cause intense headache or even temporary mental changes, when it is associated with influenzal encephalitis. Treatment is symptomatic and recovery is the rule.

Syphilitic Meningitis is important because it is curable if diagnosed in time. It occurs in both acquired and hereditary syphilis, generally during the early part of the disease; in fact, it may accompany the secondary rash. Localized forms also occur, causing localized paralyses, often of the motor oculi or facial nerves. The cerebrospinal fluid shows a pure lymphocytosis and the blood a positive Wassermann reaction.

Tuberculous Meningitis is invariably fatal within a month of the appearance of symptoms and the more acute cases survive only a few days. The cerebrospinal fluid shows lymphocytes; tubercle bacilli may also be seen and injection of the fluid into a guinea-pig causes typical tuberculous lesions.

Meningitis Circumscripta Serosa is the rather pompous name given to certain cysts that sometimes press on the spinal cord and seem to be the relic of localized inflammation.

Benign Aseptic Meningitis occurs chiefly in children, but may affect adults. The onset is abrupt, with headache, fever, neck rigidity and a positive Kernig's sign. The cerebrospinal fluid shows lymphocytes, which may make one suspect tubercle and a "spider's web" on standing. Sulpha drugs appear to be effective.

MENSTRUAL DISORDERS—See Gynaecology.

MENTAL DISEASES

As many forms of mental disease are of both doubtful origin and varied symptomatology, classification is subject to change as new discoveries are made or old theories discarded, but some sort of classification is necessary as a guide to symptoms, treatment and prognosis; in practice, however, one type of mental disease is so apt to merge into or mix with another that clear definition is impossible.

The broadest distinction is perhaps into neuroses and psychoses, the neurotic patient not being considered "mad" and therefore not requiring institutional treatment, whereas the psychotic is the opposite, but the dividing line is not always definite.

When the cause is known but cannot be treated, as in microcephalics, mongols, cases of gross injury to the brain or senility, a way of life may be found which renders their existence less trying to themselves and other people.

In certain cases the cause can be both found and treated; hyperthyroidism, myxoedema, pernicious anaemia, syphilis, intoxications of various sorts, vitamin deficiency and to some extent arteriosclerosis will all occur to the reader's mind as removable causes of mental disease. In other cases, particularly those occurring at times of sexual stress, namely, puberty, engagement, unrequited love, marriage, pregnancy, the puerperium, lactation or the climacteric, a great deal can be done by treating the cause; in the milder cases of climacteric mental disorders hormone therapy is often successful, but it is apt to be disappointing in the more severe; it is, however, worth trying.

The influence of heredity is profound. As a friend of the writer's observed when discussing the present article, "It depends on what is in the packet when it arrives".

Many people pass through the most frightful experiences without apparent mental damage, whereas others are thrown off their balance by a comparatively trivial circumstance, and one cannot help thinking that if it had not been that, it would have been something else.

The influence of sex life on sanity has been so thoroughly discussed elsewhere and details are so readily obtainable at almost any bookshop that it will suffice us here to say that it is undoubtedly great in the neuroses and minor psychoses, but not in the major ones. Its importance is often exaggerated, because in many cases peculiar sexual experiences are the result, not the cause, of mental disease. Every intelligent human being in this world has certain secrets and possibly odd ambitions which have never been told to anyone else, but, far from causing madness, the phenomenon is so universal that it can be considered as part of the psychological make-up of the normal individual—if there is such a person.

AFFECTIVE PSYCHOSES.—In these conditions the mood and emotions become abnormal; the patient may show any degree of mania, from undue cheerfulness and garrulity to extreme violence, or, at the opposite end of the scale, he may suffer from any degree of depression. When they alternate, we have the common manic-depressive insanity, but in the involutional psychoses of later life depression greatly predominates.

MANIC-DEPRESSIVE INSANITY.—The manic phase usually lasts some weeks and the depressive a good deal longer, but there are great variations. Delusions and hallucinations occur, but they tend to be transient and unsystematized, and are the result, not the cause of the emotional upset. For instance, the "affective" patient will be depressed, and mention that he has lost all his money, the depressed paranoiac will believe that he has lost all his money and mention that he is depressed. But the schizophrenic can believe that he has lost all his money and not be in the least depressed about it.

Frequency.—Between 10% and 15% of all psychoses in the U.S.A. (Henry).

Aetiology.—Females are affected twice as often as males, and the condition is commonest at or about one of the sexual crises already mentioned, such as puberty or the climacteric, but there is generally a hereditary element as well. Other factors (to which the psychoanalyst attaches great importance), are the patient's upbringing and sexual experiences; the final precipitating event may be the least important of all. If a gun is not already loaded pulling the trigger has no result.

Symptoms.—In the manic phase the brain works too quickly to make sense; the patient talks rapidly and incoherently, laughs or cries, boasts, "gushes" or quarrels with equal facility and lack of provocation, suffers from delusions which do not become "fixed", sleeps little, often eats voraciously and becomes over-sexed, but is easily distracted from the interest of the moment. In short, the condition resembles the excitable phase of drunkenness. After a few weeks or months the patient calms down and may have an interval of normality or pass straight into the depressive phase, which can be mild, stuporous or agitated; delusions are present, but as already mentioned they are the effect, not the cause, of the depression. Anorexia, anaemia, constipation, loss of weight and refusal of food are common physical accompaniments.

Prognosis.—This is good, about half the patients suffering from only one cycle, but the later and more gradual the onset, the less is the likelihood of permanent recovery. New methods of treatment have improved the prognosis, especially in the depressed phase, and hope is further increased if some defect in the patient's metabolism, endocrine system or surroundings can be discovered and eliminated.

In general, the greater the element of confusion in any psychosis the greater is the prospect of cure, because confusion commonly results from some form of toxæmia.

TREATMENT.—Of first importance is the prevention of suicide during the depressed phase. Two points must be remembered; the attempt is apt to be both sudden and successful, and it is by no means unknown during convalescence. Precautions must, therefore, never be relaxed so long as any symptoms endure, and these patients must never be allowed to have razors, knives, ropes, wires, access to upper windows or any of the other possible means of self-destruction which an observant physician will notice in the immediate surroundings.

Suicide in these cases is particularly tragic because otherwise so many of them get well.

If an organic cause is suspected, it must be followed up most carefully and appropriate treatment given, even the "therapeutic test" being occasionally successful. In other cases a social or sexual readjustment may be followed by improvement.

Drug Treatment.—If it is desired to quieten a violent patient intravenous Cyclonal Sodium or Pentothal will produce the desired effect and may be followed by Sodium Amytal, 3 grains every three hours, more or less according to circumstances. Gardenal (gr. 1-3)

has a longer effect and may be given twice daily, or any barbiturate that the physician prefers may be used. Paraldehyde, if the patient can be persuaded to take it, is preferred by some, but hyoscine and morphia as a rule are not suitable.

The newer methods of treatment, particularly electrically induced fits, are very successful in the depressive phase but seem to have little effect in the manic phase.

The reader who wishes to practise these new methods should attend a course at a recognized mental hospital, because in inexperienced hands they may be not only useless but dangerous. A well-written and informative little book on the subject is Sargent and Slater's *Introduction to Physical Methods of Treatment in Psychiatry*, published by Livingstone.

SCHIZOPHRENIA (pronounced SKIDZOFRENIA).—As this form of mental disease accounts for nearly half the asylum population of the world, and as the new methods of treatment just referred to are giving promising results the subject is of interest.

Ætiology.—Some authorities deny the influence of heredity, on the obvious grounds that many schizophrenics develop symptoms and are therefore in an institution before they have had a chance to found a family; but there is no doubt that a neuropathic taint is of prime importance, as shown by the frequency of an abnormal grandparent, a drunken father, a relative in a lunatic asylum or suicides in the family, and finally by the fact that if one uniovular twin develops schizophrenia the other does so in about 80% of cases (Lewis).

As the disease commonly begins in adolescence it would seem that either certain endocrines or the "grown-up thoughts" that accompany their presence in the body might have something to do with it, but no giving or deprivation of endocrines has so far had any effect. There is, however, a strong sexual factor, such as sexual frustration or homosexuality.

Shyness and undue sensitivity, followed in due course by prudishness and aloofness and later by vanity and rudeness, in other words attempts to conceal that much-advertised condition "the inferiority complex", are all associated with schizophrenia, and it seems that the patient, disappointed with his misguided attempts to establish normal and friendly relations with the outside world, turns his consciousness inwards and finds consolation in exploring the recesses of his own personality; a pursuit which he finds so engrossing that he becomes lost to everything else. It is, however, a curious fact that up to quite a late stage these patients retain a good memory and are not disorientated. In Macnamara's words "they know who they are, where they are and when they are", but they do not care. Ultimately, in a progressive case, mental deterioration sets in. A tragic parallel on a national scale is that of Germany between 1933 and 1945.

Schizophrenia might perhaps be described as the unfortunate result of a pathological struggle for self-esteem on the part of a genetically defective person.

Four types are usually described.

SIMPLE.—This begins gradually and is characterized by a slowly increasing lack of interest in the outside world, including such things as cleanliness, duty and friendship. Transient delusions and hallucinations occur and do not seem to worry the patient unduly. Progress is variable, but in many cases the patient is able to perform simple tasks in a rather vague and uninterested manner and can live at home.

HEBEPHRENIA.—This, so called from Hebe, the Greek goddess of youth, is a rather elaborate way of saying that the patient's behaviour is thoroughly childish in the worst sense of that word. He giggles, is disconnected, impulsive, mischievous, dirty and "dreamy", and often has little idea of the difference between right and wrong. This is the rarest form of schizophrenia. It usually begins in adolescence, the onset is gradual and the prognosis poor. Mental deterioration may be early and rapid.

CATATONIA.—This is perhaps the commonest and most dramatic variety of schizophrenia; it also has the best prognosis, which improves in proportion to the suddenness of the onset and the violence of the symptoms. The severity of the symptoms varies from time to time and they may even disappear. Depression may alternate with excitement; delusions, hallucinations, "voices" and compulsions are common and the most extraordinary postures, mannerisms and rituals may be practised. In the stuporous form the patient may lie quite still for days or suddenly have an outburst of violent and destructive excitement; dirty or lewd habits are common. In short, the catatonic provides most of the comic stories about lunatics and their ways. At times, however, there may be a brief though startling lapse into sanity which conveys the impression that the bizarre conduct is due more to a fault in the mechanism which interprets the inner personality to the outside world than to any fault in the personality itself. A defective camera can make a grotesque picture out of a beautiful subject, or a bad loudspeaker a hideous din out of a good broadcast, but it is not the fault of the subject or the broadcast.

PARANOID FORM OF SCHIZOPHRENIA.—This generally comes on rather later and more slowly than the other forms, so the prognosis is poor.

Delusions of persecution or grandeur, tending to become fixed, but never reaching the strict fixity of the rare and nowadays disputed pure paranoid, are the chief feature of this class. As mental deterioration progresses the delusions become less systematic and the patient appears to lose all interest in their emotional implications.

The holders of delusions of persecution are not only a nuisance to the community owing to their suspicions, quarrels and (if they can afford it) litigation, but they are also a danger because they may murder anyone against whom they imagine they have a grievance. Institutional treatment, therefore, is indicated.

TREATMENT.—A detailed account of the psychotherapeutic treatment of schizophrenia would be out of place here; it takes a long time, requires a highly specialized training and is often less successful than the more empirical methods about to be mentioned.

Insulin therapy, of which a slight outline follows, has given encouraging results. In America, cure, great improvement and slight improvement percentages are about 11, 25 and 25 respectively, compared with 3, 11 and 7 by other methods. The earlier the treatment is begun the better, so early diagnosis is essential.

As remarked above, only the barest outline is needed here because those practising the method must learn it at the bedside. Briefly, it consists of giving daily injections of sufficient insulin to produce hypoglycaemic coma for about half an hour, at the end of which the coma is interrupted by a sugary nasal feed or an intravenous injection of 100 c.c. or more of 33% glucose. It is usual to give 20 units of insulin on the first day and to increase the dose until a satisfactory coma is produced, the coma coming on about three hours after the insulin has been given. If the patient does not show marked improvement after two months the treatment is stopped. In favourable cases he will wake from the coma in a normal state quite early in the proceedings.

The most suitable patients are young, otherwise healthy and recently affected. If there is doubt about the diagnosis, remember that schizophrenia is by far the commonest mental disease of adolescence, and that it is better to cure the patient than to waste time on diagnostic hair-splitting.

The treatment is unsuitable or even dangerous for patients above middle-age or for those suffering from other diseases.

Convulsion treatment is less successful, but is sometimes combined with insulin treatment when the patient is lethargic or depressed. Whether the cure will be permanent remains to be seen, but the indications are that relapses are amenable to treatment. It also remains to be seen whether the "cure" of schizophrenia will be of ultimate benefit to mankind, because it releases for procreative purposes a number of schizophrenics who would presumably not be allowed to exercise that function if kept in an asylum.

PARANOIA.—As already hinted, some modern psychiatrists dispute the existence of this disorder as a separate class, contending that in the long run it is found to be due to schizophrenia, the depressive phase of manic-depressive insanity, or one of the toxic psychoses. However, it has certain clear-cut characteristics in its earlier stages, although it may later be found that the case is one of those just mentioned.

The development of symptoms is gradual, usually in middle life, is commoner in men than in women and in bachelors than in married men. Suppressed or even sublimated homosexual cravings have been adduced as subsidiary causes and there is also a hereditary factor.

The presence of fixed or systematized delusions is characteristic of the condition. The delusions are usually of persecution, so the patient may be dangerous, sometimes they are of grandeur, when he becomes amusing or boring, or sometimes erotic, when he becomes tiresome. When his delusions do not concern his work or his associates the patient's conduct is quite rational. He can attend to his business normally, he can make out his will, he knows his friends and relations and eats normally, but often sleeps badly. The prognosis is generally bad when the delusions have become systematized, but the question of institutional treatment depends largely upon their nature and severity and upon the progress of the patient. Some of the paranoid psychoses benefit from shock therapy, particularly if the patient is depressed.

OBSESSIONS.—These are so common and often so harmless that many of them verge on normality. Two points differentiate them from delusions and schizophrenic impulses; the patient feels that they come from inside him, not from outside, and he sees their foolishness so tries to resist them.

Many have their origin in some quite normal or even beneficial act, for instance, most people empty their bladder before going to bed a very natural and proper thing to do; but if a patient takes some time to go to sleep and gets up every few minutes in order to void a few drops of urine he is suffering from an obsession.

Obsessions may take various forms, such as the following.

Compulsions.—These, as the patient realizes their unsuitability, are seldom obeyed. Under this head come sudden inclinations to commit suicide, to tell one's superiors what one really thinks of them, and to do what is often described as "throwing a spanner into the works". In their more chronic form compulsions turn into rituals, but these do not become so intricate or absurd as those found in schizophrenia.

Phobias.—The best known are claustrophobia, where a patient is afraid of being shut up, and its opposite, agoraphobia. Other common ones are fears of infection, dirt, cancer or venereal disease, and the patient will not only take unnecessary and elaborate precautions to avoid the thing he dreads, but often fears that he has been contaminated when he has not.

Images and subtle meanings.—These are usually of an unpleasant or lewd nature. It has been frivolously remarked that "a dirty mind is a continual feast", but if a patient is constantly imagining or visualizing obscenity or unpleasantness where none exists he is suffering from an obsession.

TREATMENT.—From what has been said it will be seen that treatment should be on what might be called mild psycho-analytical lines; in other words, a careful and sympathetic discussion will often reveal the cause of the obsession, which becomes much less fearful when logically explained, and consequently is likely to disappear. Many of these obsessions have their origin in a youthful experience, sometimes erotic, so the patient may be ashamed of it,

and may require very tactful handling before he will reveal it. Other obsessions can be traced to a perfectly obvious cause, such as a bomb explosion, but even so the patient feels some secret shame at his conduct on the occasion. This shame may be difficult to remove, but is apt to be made less by confession. A change of scene, associates and routine may help, and the patient may find on his return home that he has lost his obsession.

If there is marked depression, convulsion therapy is indicated, and in the worst cases, after other methods have failed, leucotomy may hold out the only hope.

MENTAL DISORDERS ASSOCIATED WITH OLD AGE.—These resemble those seen in renal disease and high blood-pressure; the cause is a general deterioration of the brain cells because of the inadequate nourishment they receive.

Dramatic interruptions due to thrombosis are liable to occur and are followed by paralyses, speech defects, disorders of the senses, incoordination, diminution of consciousness, etc., according to the situation and extent of the damage.

Apart from these incidents, senile psychoses tend to develop gradually and are rare below the age of 60 years, but "a man is as old as his arteries". Loss of memory for recent events, reseatment of change, garrulity, unwelcome admiration for young women, inability to think or act constructively or clearly, irritability and emotional instability are some of the typical and well-known symptoms, the last-mentioned being particularly noticeable after the patient has recovered from a "stroke". In severe cases there may be delusions and hallucinations and the trend of events is to deterioration and ultimate dementia.

Owing to the increasing average age of modern humanity these cases are becoming commoner.

ALZHEIMER'S DISEASE AND PICK'S DISEASE.—These deserve passing mention because they are associated with senility, but occur earlier than ordinary senile dementia; they are also commoner in women than in men. Speech difficulties, poor memory, dullness and moral irresponsibility characterize these disorders.

TOXIC PSYCHOSES.—These, as the name implies, are due to the presence of a toxic substance in the body. This substance may be either endogenous, that is, formed in the body as in the delirium of fevers, in uraemia, and perhaps in the sexual crises already mentioned, or exogenous, that is, absorbed from outside, as in alcohol and other drug addictions.

Presumably as a result of centuries of custom, Western people are content to take alcohol in harmless moderation, but Eastern people often find difficulty in doing so, whereas exactly the reverse is true of opium and sometimes of hashish. Owing to stricter control of supplies, drug addicts are much rarer than they were formerly.

As would be expected, endogenous toxic psychoses are transient and associated with hallucinations and confusion. Treatment is that of the cause, together with sedatives when required.

ALCOHOLIC PSYCHOSES.—These are of several kinds, but it should be remembered that chronic severe alcoholism is quite as likely to be the symptom of a psychosis as the cause of it.

An attack of *drunkenness* is too familiar to need description, but from a psychological point of view it is interesting because it gives an insight into the patient's basic personality; that this fact has long been recognized is shown by the Latin tag *In vino veritas*, which has been translated as "Truth lies under a cork". The degree of drunkenness may vary from slight euphoria to deep coma. In severe cases the stomach should be washed out or the patient given an emetic if the liquor has not already made these measures unnecessary.

DELIRIUM TREMENS.—This often manifests itself when a chronic alcoholic meets with an accident, falls ill from some other cause or when, after a prolonged drinking bout, alcohol is withdrawn.

The patient is disorientated, excited, tremulous, sleepless and frightened, but often quite insensitive to external stimuli. He also has hallucinations of a most unpleasant character; "pink elephants" are the classical hallucination, but he often sees reptiles, insects or vampires and hears screams and voices. For the best description of this psychosis yet written, the reader is referred to Kipling's *La Nuit Blanche*.

Unless terminated by treatment an attack lasts for two or three days, and the patient may throw himself out of a window, or even die of exhaustion.

Treatment.—This is by sedation, elimination and neutralization. Sedation is not always easy because of the patient's rowdiness and because drugs may have to be given in dangerously large doses, but an intravenous barbiturate will generally settle him or a dose of hyoscine (up to $\frac{1}{8}$ grain or more, may be required) with morphia. Barbiturates by the mouth, such as 6-9 grains of Sodium Amytal, may also send the patient to sleep. A rowdy patient can often be controlled by a large ($\frac{1}{2}$ grain) dose of apomorphine; at first he is so busy vomiting that he has little time to do anything else; later he becomes sleepy.

Elimination is best carried out by giving the patient a large dose, 10-20 grains, of calomel, and neutralization has been reported by the giving of large intravenous doses (100-200 milligrams) of vitamin B₁.—*Berin Forte* (Glaxo) contains 100 mg. per c.c. and is the best for the purpose.

ALCOHOLIC HALLUCINOSIS.—This is rarer than the above and differs from it in several ways; symptoms are less violent, they last for weeks or months, the patient is not disorientated and may even carry on his work, but he is tormented by hallucinations of voices, which may be so real that he answers them. The danger is that he may think the persecutory voices belong to friends or relations, so he may try to avenge himself on them.

Treatment is institutional, but large doses of Berin have proved beneficial.

KORSAKOFF'S SYNDROME.—This is found in polyneuritis due to other toxæmias, but alcohol is the commonest cause.

The syndrome is unmistakable because not only is the patient's memory for recent events defective or absent, but in order to fill up the gap he describes events which never occurred, although they may sound quite plausible. Treatment is by large doses of vitamin B, but the physical health is often very poor.

Finally, alcoholic dementia, in which the patient degenerates into what may be described literally as "a drivelling idiot" sets in in those whose bodies have been strong enough to survive years of abuse and poisoning.

TREATMENT OF ALCOHOLISM.—The treatment of alcoholism is best carried out in an institution, and is apt to be long and ultimately discouraging, but there have been many successes.

Replacement therapy by means of Benzadrine and barbiturates, the creation of nausea by giving apomorphine or emetine, treatment by hypnotism, treatment by suggestion under barbiturate amnesia, and the creation of a mild amnesia by means of atropine and byoscine all have their advocates, but "the dog returneth to his vomit" and the two essentials to cure, namely the wish to get well and the strength of mind to do so, are often lacking. A change of scene, if possible to a "dry" area, and, particularly, a change of companions, are also necessary.

Any woman should be strongly discouraged from marrying an alcoholic in the hope of saving him.

DRUG ADDICTION.—The widespread but moderate use of *opium* in the East has already been mentioned, but excessive addiction, or the taking of *morphia* is most pernicious, the patient degenerating morally, mentally and physically. This especially concerns us, because a fair proportion of the patients are doctors or nurses, the reason, of course, being that they have access to the drug. Certain important facts should be remembered. The first is that, unless a patient is suffering from an incurable and fatal disease, never give him morphia regularly for more than a fortnight, or he will become an addict. Secondly, its withdrawal from an addict is accompanied by intolerable distress, which lasts for four or five days and is best relieved by assorted barbiturates. Thirdly, sudden withdrawal is better than gradual. Fourthly, relapses are common and the patient's promises to reform can never be trusted. The writer has seen a medical patient after a long and convincing talk about how he was keeping off the drug, go straight to the nearest chemist and write himself a prescription for a dozen tubes of morphia tablets. These, he explained to the chemist—who did not believe him—were for his patients.

Owing to difficulty of access, the *cocaine* habit is now rare. The drug is administered by injection or as snuff and in addition to the usual moral degeneration is accompanied by hallucinations of sensation, as if bugs were crawling under the skin. In spite of the barrowing descriptions given by sensational novelists, its withdrawal causes far less distress than is the case with other drugs.

Hashish (Bhang, Charas, Ganja, in India. Marihuana in China

and the U.S.A., where it is commonly smoked in cigarettes, which are also called reefers, muggles or goof butts: the pharmacopoeial name is *Cannabis Indica*).

This is smoked or chewed widely, largely for the erotic feelings and hallucinations, particularly those of floating through space, that it causes. It is taken for these reasons, and not, as in the case of morphia, because the patient is miserable without it. Certain people become extremely violent under its influence and if taken habitually it leads to mental and moral degeneration.

Bromide addiction slows up the patient's mental processes, his memory weakens, he has to repeat things, he may have hallucinations and an acneiform bromide rash may be present. Improvement follows withdrawal.

SOME NOTES ON THERAPY (*See also Insulin Therapy under Schizophrenia.*)

CONVULSION THERAPY.—This has been found useful in the catatonic variety of schizophrenia, particularly when the patient is lethargic, but it has had perhaps its greatest success in the depressive involutional psychoses of middle life. The original method to be extensively practised was the giving of Cardiazol (leptazol, metrazol, pentamethylenetetrazol) the first dose being 2.5 c.c. of a 10% solution intravenously on an empty stomach, and later the dose is adjusted to the smallest amount that would produce a typical epileptiform convulsion. The convulsions were produced two or three times a week until improvement set in and then repeated at the first sign of relapse. This has now been largely replaced by the electrical method, in which the electrodes are placed on the patient's temples or forehead and a current of between 70 and 100 volts passed between them. If no manifest improvement occurs after a dozen fits have been induced the treatment should be discontinued.

Precautions in the form of a rubber ring between the teeth are taken against tongue-biting, and against spinal or other fractures by firmly securing the patient to the couch, giving him a spinal anaesthetic to protect the legs, or, much better, by giving him a dose of curarine beforehand.

PREFRONTAL LEUCOTOMY.—This is an operation for the brain surgeon; it is also a new operation. Although in the interests of research and hence of humanity it has been tried out on types of case which subsequent experience has shown to be unsuitable, it has not, like so many novel procedures, ultimately suffered in reputation because of the misguided enthusiasm of its pioneers; perhaps because the pioneers are skilled neurologists and neurosurgeons, not journalists or politicians.

It has already been remarked that the optic thalamus is the seat of the consciousness of pain and pleasure, which do not travel above this level, but the optic thalamus can apparently be influenced from the higher level, that is to say by the cortical cells.

Although the function of the anterior part of the frontal lobe is not fully understood, it is believed that it deals partly with judgment

and memory but chiefly with turning things over in one's mind, or ruminating.

To take a flight of pure fancy, one could imagine the following conversation.

Prefrontal cortex: "I have been working things out and find that I am in debt to the extent of 15,000 pounds and have no assets at all."

Optic thalamus: "But this is ghastly, what are we going to do?—it is the most terrible thing that could happen."

Cortex: "I also find that because of the sins of my youth I have become an outcast not only during my life but after death as well."

Thalamus: "What shall I do, what shall I do? There is no hope, no happiness, just disaster, misery and ruin for evermore," etc.

It will be noticed that the cortex provides the ideas but the thalamus points out their emotional significance.

The operation of leucotomy consists in dividing the tracts running in the white matter between the anterior frontal convolutions and the optic thalamus.

After the operation, therefore, a patient who has, perhaps for years, been turning over in his diseased mind all sorts of ideas and delusions, which to the optic thalamus are intensely depressing, becomes freed from these meditations. The result is that his outlook on life becomes more cheerful and his conduct more normal. He also lacks initiative, judgment and sometimes self-restraint, but these are more than compensated for by the lack of depression.

Suitable Cases.—As the operation requires a very high degree of skill and is not without danger it is usual to perform it only on patients who have been refractory to milder means, such as psychotherapy, insulin therapy and convulsion therapy. So far, the best results have been achieved in cases of chronic obsessional and chronic depressional insanity, severe anxiety neuroses and certain of the more violent types of catatonic schizophrenia.

GENERAL PARALYSIS OF THE INSANE.—This is almost unknown in India, possibly because the spirochaete is a less virulent one than that found in Europe and America, and possibly because timely attacks of malaria and other fevers prevent potential sufferers from developing the disease. The last hypothesis is the more probable, because it has been found that the earlier malaria therapy is applied the better.

SYMPTOMS.—When a middle-aged person or a congenital syphilitic begins to degenerate mentally, lacks co-ordination, talks slurringly, has delusions of grandeur, has unequal or Argyll-Robertson pupils, no knee jerks, a positive Wassermann reaction in both the blood and cerebrospinal fluid and a positive Lange's colloidal gold test, he has got G.P.I. He may also have had one or two fits, each followed by a rapid deterioration.

TREATMENT.—Routine anti-syphilitic treatment is given, not because it improves the psychoses, but to prevent things from getting worse. Infection with B.T. malaria is also carried out, either by means of infected mosquitoes or by an intramuscular injection

of 5 c.c. of malaria-infected blood. The mosquitoes are applied to the skin in a container such as a tumbler, with the open end covered with mosquito-netting, through which they bite the patient.

The first attack of fever occurs nine or ten days after an injection of blood or about a fortnight after mosquito infection. The patient is allowed to have about a dozen rigors if his condition permits it, and then anti-malarial treatment is begun. Other methods of producing fever are by diathermy machines, hot boxes and intravenous T.A.B. vaccine, but the malaria method is the easiest and on the whole the most satisfactory.

The amount of improvement is usually great, and is inversely proportional to the amount of damage to the brain.

Asylum patients generally require several months before they are fit for release.

SUMMARY

Although psycho-analysis has greatly helped our insight into the hidden recesses of the human mind, it has not helped our treatment of its diseases to a corresponding extent. This is probably because many psychoses, although influenced and aggravated by previous and present surroundings, have their true origin much further back, namely in the ancestry of the patient. It is a sobering thought that mental disease, which demands for its comprehension the very highest qualities of the human mind, can be more effectively treated by crude empiricism than by the noblest philosophy.

METATARSALGIA (MORTON'S DISEASE)

This occurs most commonly in women and usually in one foot, the pain being situated under the head of the fourth metatarsal bone; almost always the patient relieves the pain by removing her shoe and squeezing the metatarsal heads together with her hand.

TREATMENT.—The simplest method is to fix a small pad of felt or leather just behind the head of the fourth metatarsal bone; the pad may be attached to a bandage or to a piece of sticking plaster. It increases the transverse arch of the forefoot, which is what the patient does when she squeezes it to relieve the pain, so it has the same effect.

Another method is the metatarsal bar, which is fixed across the sole of the shoe just behind the metatarsal heads.

In very obstinate cases it may be necessary to remove the head of the fourth metatarsal.

METEORISM—*See* Flatulence.

MIDWIFERY—*See* Obstetrics.

MIGRAINE

The typical case begins at or about puberty and is characterized by recurring attacks of severe and sometimes unilateral headache, which generally begin in the morning, are accompanied by nausea, vomiting and visual disturbances and temporarily incapacitate the patient.

Although the writer has seen the disease begin in middle age, the male patient can always be promised that it will not persist into old age, and the female that it will cease at the menopause. It is worth remembering that occasionally migraine may be the cause of transient and recurring paralyses affecting the limbs, the eyes or even the power of speech.

The cause is still debated, but it appears to be a spasm and dilatation of certain cerebral arteries, particularly those of the dura or possibly one of the choroid plexuses. There appears to be a strong hereditary element and the disease may be associated with epilepsy, as it is not uncommon for epileptics to have a family history of migraine.

A careful examination must always be made to exclude organic nervous disease (especially cerebral tumour or, in older people, syphilis); high blood-pressure, heart or kidney disease and diabetes must also be excluded.

Among others, Hurst strongly supported the theory that the disease was a symptom of minor errors of refraction, but this is now considered to be wrong, although it is agreed that refractive errors should be corrected.

TREATMENT.—The most successful drug is ergotamine tartrate. Many patients get warning of an attack, sometimes the day before, when a dose of 2–4 tablets of Gynergen (Femergin) each containing one milligram of ergotamine tartrate may avert or abort an attack.

If the attack has begun, an intramuscular or subcutaneous injection of 1 c.c. (one ampoule) of 1:2,000 solution may be given, or in very severe cases it may be given intravenously. Ergot must not be given for long periods or in excessive doses or it may cause gangrene.

A more recent method of preventing attacks is by the regular administration of carbamylcholine chloride (carbachol, Moryl, Chloryl, Doryl). The dose is one or two tablets of carbachol (2 mg. each) three times a day, and the drug can apparently be taken for months without harm.

If the above drugs are unobtainable, a stiff dose of ergot (a drachm and a half of the tincture or 30 grains of Ergota Preparata) may have a good effect during an attack, or one of the many hypodermic products may be injected.

For the headache, aspirin in full doses, e.g., 20 grains, or Gardenal (Luminal) in 1½–3 grain doses, may be helpful.

MISCELLANEOUS FORMULAE

Anti-freezing Mixtures.
 Arsenical Paste
 Arsenical Paste, Dental.
 Battery Solutions.
 Bay Rum.
 Camphor Ball.
 Cremor Bismuthi.
 Drooping Flowers, How to revive
 Eau-de-Cologne.
 Eggs, Preserving.

Fire, Extinguishing.
 Fire in Chimney, How to extinguish.
 Benzol or Petroleum on Fire, How to extinguish.
 Fire-proofing Solution for Fabrics.
 Fly Papers.
 Foot Powder.
 Freezing Mixtures.
 Gunpowder Marks.
 Lavender Water.

MISCELLANEOUS FORMULAE—*continued*

Lubricants—Catheters and Urethral Instruments.	Soaps, Medicated.
Lubricants—Cystoscopy.	Sponge Powder.
Mould on Bindings.	Stains, Removal of.
Quinine Pessaries.	Stains on Hand, Methods of Removal of.
Rough Hands, How to prevent.	Tattoo Marks.
Rust-proof Coating for Iron	Tooth Pastes.
Skin Varnish	Water Softener.
Smelling Salts.	Wax Aseptic.
Smoke Cartridges for Testing Drains.	Witch Hazel Cream.

ANTI-FREEZING MIXTURES

R Methylated Spirit .. pint 1	R Methylated Spirit .. pint 1
Water gal. 1	Glycerin oz. 10
	Aquam ad gal. 1

The solution must be kept up to strength by the addition of methylated spirit occasionally, as the alcohol evaporates.

R Calcium Chloride .. lb 3	R Glycerin lb. 2
Water to gal. 1	Water to gal. 1

ARSENICAL PASTE

ARSENICAL PASTE FOR CURING ANIMAL SKINS:

R Potassium Carbonate oz. 6
Arsenious Oxide oz. 16
Soft Soap oz. 15
Slaked Lime oz. 2
Powdered Camphor oz. 2½
Powdered Black Pepper oz. 2

Water sufficient to make a soft paste.

ARSENICAL PASTE (DENTAL):

R Arsenious Acid 2 parts
Morphine Sulphate 1 part
Creosote to make a stiff paste.

BATTERY SOLUTIONS

Leclanché Cell

Solution of Sal Ammoniac, nearly saturated

Carbon and Zinc Battery

R Sodium Bichromate	145 gm.
Sulphuric Acid ..	300 c.c.
Distilled Water ..	1,000 c.c.

SPIRITUS MYRCIAE CO. (BAY RUM)

R Oil of Cloves ℥ 5	R Oil of Myrcia .. 16 c.c.
Oil of Pimento ℥ 10	Oil of Orange Peel 1 c.c.
Oil of Bay Leaf ℥ 30	Oil of Pimento .. 1 c.c.
Solution of Ammonia Rum pint ½	Alcohol 1,220 c.c.
Distilled Water pint 1½	Water q.s., to make 2,000 c.c.
Rectified Spirit pints 2	Mix the oils with the alcohol and gradually add the water. Set aside for eight days and filter.

CAMPHOR BALL (OR TABLET)

R Camphor Flowers 4 parts
Spermaceti 4 parts
White Wax 12 parts
Almond Oil 5 parts

Melt the fatty bodies in a water-bath, and add the camphor. Dissolve. Stir till cool and pour into a mould.

CREMOR BISMUTHI

Hydrated Oxide of Bismuth, freshly prepared, 1 part, water 4 parts. Rub together until smooth.

DROOPING FLOWERS, HOW TO REVIVE

Place the flowers in this solution:

R. Acid. Acetylsalicylic.	..	..	..	gr. 30
Aquam ad	..	..	..	gal. 1

EAU-DE-COLOGNE

R. Oil of Lavender ..	℥ 18	R. Oil of Bergamot ..	..	1.25
Oil of Bergamot ..	℥ 50	Oil of Lemon ..	..	0.50
Oil of Lemon ..	℥ 40	Oil of Neroli ..	..	0.20
Oil of Neroli ..	℥ 10	Oil of Rosemary ..	..	0.05
Oil of Cinnamon ..	℥ 10	Oil of Thyme ..	..	0.05
Oil of Rosemary ..	℥ 10	Orange-Flower Water ..	..	4.50
Rectified Spirit ..	℥ 30	Alcohol to	..	100.00
		Dissolve the oils in the alcohol, and add the orange-flower water.		

EGGS, PRESERVING

Smear with Vaseline and immerse in Lime Water.

R. Water-Glass ..	..	lb. 1
Water, Boiling ..	..	gal. 1½
Dissolve, and when cool immerse the eggs in the solution.		

FIRE, EXTINGUISHING

The number of solutions is endless; the following are good examples:

R. Sodium Sulphate.		R. Calcium Chloride	..	lb. 15
Ammonium Chloride.		Sodium Chloride	..	lb. 5
A solution of the above in molecular proportions.		Water to	..	gal. 10
On a fierce fire SO ₂ and NH ₃ are liberated, smothering combustion, while the burnable matter is covered with a film of NaCl.		R. Ammonium Chloride	..	lb. 10
		Common Salt	..	lb. 20
		Water	..	gal. 7

Fire-extinguishing cylinders, of which there are many on the market, contain compressed carbon dioxide, the jet of gas from the nozzle being directed on to the fire.

FIRE IN CHIMNEY.—Extinguish by sulphur fumes, a few ounces of sulphur being held over the fire in a shovel.

BENZOL OR PETROLEUM ON FIRE.—Cover with any absorbent material such as sand, and then extinguish the flames with chloroform.

FIRE-PROOFING SOLUTION FOR FABRICS

R. Boric Acid ..	..	..	..	5 parts
Borax ..	..	..	..	6 parts
Water ..	..	..	..	100 parts

Simply immerse the fabric in the solution and hang up to dry; it does not rot or stiffen the material.

FLY PAPERS

Arsenical

R Sodium Arsenate .. oz. 4
 Brown Sugar .. lb. 1½
 Water .. gal. 1
 Dissolve Dip sheets of unsized purple paper in the solution and dry.

Sticky

R Linseed Oil, boiled until stringy .. 4 parts
 Castor Oil .. 1 part
 Dissolve in carbon bisulphide and paint on strips of thick paper.

FOOT POWDER

Pulvis Acidi Salicylici Compositus (B.P.C.)

R Salicylic Acid .. oz. ¾
 Boric Acid .. oz. 2½
 French Chalk .. oz. 21½

FREEZING MIXTURES

	Parts by Weight	Temperature reduced from 10° C. or 50° F. to
Mix. Hydrochloric Acid ..	8	-17° C. or + 1° F.
Sulphate of Sodium ..	5	
Mix. Snow, or Fine-shaved Ice ..	2	-18° C. or 0° F.
Chloride of Sodium ..	1	
Mix. Dilute Nitric Acid ..	2	-19° C. or - 2° F.
Sulphate of Sodium ..	3	
Mix. Dilute Nitric Acid ..	4	-26° C. or -15° F.
Nitrate of Ammonium ..	5	
Sulphate of Sodium ..	6	-29° C. or -20° F.
Mix. Dilute Nitric Acid ..	4	
Phosphate of Sodium ..	9	

GUNPOWDER MARKS, HOW TO REMOVE

When grains are firmly embedded in the skin and cannot be removed by mechanical means, disappearance in two days can be obtained by the application of hydrogen peroxide in full strength.

LAVENDER WATER

R Oil of Lavender .. ʒi
 Oil of Lemon .. ℥ 20
 Oil of Bergamot .. ℥ 20
 Otto of Rose .. ℥ 10
 Rectified Spirit to .. pints 2

R Oil of Lavender .. ʒiv
 Oil of Bergamot .. ʒj
 Essence of Ambergris .. ʒss
 Rectified Spirit .. gal. 1
 Orange-flower water .. ʒiv

LUBRICANTS

CATHETERS AND URETHRAL INSTRUMENTS.—Boiled olive oil is the best. It should be kept in a wide-mouthed stoppered jar, floating on biniodide solution.

Liquid paraffin or Vaseline may be used.

Also the following:

R Phenolis .. 1 part
 Oleum Ricini .. 7 parts
 Oleum Amygdalæ .. 8 parts

R Pure Carbolic Acid .. 1 part
 Castor Oil .. 4 parts
 Almond Oil .. 15 parts

CYSTOSCOPES.—No greasy lubricant can be used, as it would obscure the window. The best is the following:

R Biniodide of Mercury (1 in 2,000) in Glycerin.

MOSQUITO REPELLENTS—See Mosquito Bites.

CREMOR BISMUTHI

Hydrated Oxide of Bismuth, freshly prepared, 1 part, water 4 parts. Rub together until smooth.

DROOPING FLOWERS, HOW TO REVIVE

Place the flowers in this solution:

R Acid Acetylsalicylic.	..	..	..	gr. 30
Aquam ad	..	..	..	gal 1

EAU-DE-COLOGNE

R Oil of Lavender	..	℥ 18	R Oil of Bergamot	..	..	1.25
Oil of Bergamot	..	℥ 50	Oil of Lemon	..	..	0.50
Oil of Lemon	..	℥ 40	Oil of Neroli	..	..	0.20
Oil of Neroli	..	℥ 10	Oil of Rosemary	..	..	0.05
Oil of Cinnamon	..	℥ 10	Oil of Thyme	..	..	0.05
Oil of Rosemary	..	℥ 10	Orange-Flower Water	..	..	4.50
Rectified Spirit	..	℥ 30	Alcohol to	100.00
Dissolve the oils in the alcohol, and add the orange-flower water.						

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Smear with Vaseline and immerse in Lime Water.

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Water, Boiling	gal. 1½
Dissolve, and when cool immerse the eggs in the solution.			

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The number of solutions is endless; the following are good examples:

R Sodium Sulphite.		R Calcium Chloride	..	lb. 15
Ammonium Chloride.		Sodium Chloride	..	lb. 5
A solution of the above in molecular proportions		Water to	..	gal. 10
On a fierce fire SO ₂ and NH ₃ are liberated, smothering combustion, while the burnable matter is covered with a film of NaCl.		R Ammonium Chloride	..	lb. 10
		Common Salt	..	lb. 20
		Water	..	gal. 7

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Water	100 parts

Simply immerse the fabric in the solution and hang up to dry; it does not rot or stiffen the material.

FLY PAPERS

<i>Arsenical</i>				<i>Sticky</i>			
R Sodium Arsenate	..	oz. 4		R Linseed Oil, boiled until			
Brown Sugar	..	lb. 1½		stringy	..	..	4 parts
Water	..	gal 1		Castor Oil	..	..	1 part
Dissolve. Dip sheets of unsized purple paper in the solution and dry				Dissolve in carbon bisulphide and paint on strips of thick paper.			

FOOT POWDER

<i>Pulvis Acidi Salicylici Compositus (B.P.C.)</i>							
R Salicylic Acid	..	..	..	..	oz.	3	
Boric Acid	..	..	..	..	oz.	2½	
French Chalk	..	..	..	..	oz	2½	

FREEZING MIXTURES

			Parts by Weight	Temperature reduced from 10° C. or 50° F. to
Mix.	Hydrochloric Acid	..	8	-17° C. or + 1° F.
	Sulphate of Sodium	..	5	
Mix.	Snow, or Fine-shaved Ice	..	2	-18° C. or 0° F.
	Chloride of Sodium	..	1	
Mix.	Dilute Nitric Acid	..	2	-19° C. or - 2° F.
	Sulphate of Sodium	..	3	
Mix.	Dilute Nitric Acid	..	4	-26° C. or -15° F.
	Nitrate of Ammonium	..	5	
	Sulphate of Sodium	..	6	
Mix.	Dilute Nitric Acid	..	4	-29° C. or -20° F.
	Phosphate of Sodium	..	9	

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R Oil of Lavender	..	3j	R Oil of Lavender	..	iv
Oil of Lemon	..	℥ 20	Oil of Bergamot	..	j
Oil of Bergamot	..	℥ 20	Essence of Ambergris	..	ss
Oil of Rose	..	℥ 10	Rectified Spirit	..	gal. 1
Rectified Spirit to	..	pints 2	Orange-flower water	..	iv

LUBRICANTS

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Liquid paraffin or Vaseline may be used.

Also the following:

R Phenolis	1 part	R Pure Carbolic Acid	..	1 part
Oleum Ricini	..	..	7 parts	Castor Oil	..	4 parts
Oleum Amygdalae	..	..	8 parts	Almond Oil	..	15 parts

CYSTOSCOPES.—No greasy lubricant can be used, as it would obscure the window. The best is the following:

R Biniodide of Mercury (1 in 2,000) in Glycerin

MOSQUITO REPELLENTS.—See Mosquito Bites.

TO PREVENT MOULD ON BOOK-BINDINGS

Paint with:

R Thymol Crystals	..	..	..	..	10 parts
Perchloride of Mercury	..	..	..	..	4 parts
Ether	..	..	..	..	200 parts
Benzene	..	..	..	..	400 parts

First try on a small portion to see if the dye runs.

Label it HIGHLY INFLAMMABLE.

QUININE PESSARIES

R Quinine Sulphate	..	..	..	gr. 15
Oil of Theobroma	..	..	..	℥xii

To make twelve pessaries.

ROUGH HANDS, HOW TO PREVENT

The following is an excellent preparation for keeping the hands in good condition in cold weather and free from roughness; it should be rubbed on after washing:

R Pulv. Acidi Borici	..	..	..	℥iiss
Tr. Benzoin. Co.	..	..	..	℥ij
Liq. Camph. Co.	..	..	..	℥iv
Liq. Coca Cacti	..	..	..	℥j
Glycerin. ad	..	..	..	℥x

Shake well, allow to stand for six hours, and strain through gauze.

SKIN TONIC

R Lavender Water	..	..	..	℥ij
Eau-de-Cologne	..	..	..	℥v
Elder-flower Water	..	..	..	℥iv
Rose Water	..	..	..	℥iv

Mix and filter until bright.

SKIN VARNISH

GELANTHUM (SKIN VARNISH) (UNNA).—Soak pieces of gum tragacanth with twenty times their volume of water in the cold for four weeks. Treat with steam for one day, and when further swollen press through muslin. Gelatin in the same quantity is swollen up cold, then filtered through a steam filter, and subjected for long exposure to steam pressure. The mixture of the two is allowed to swell for two days in steam. Press again through muslin, and mix it with 5% of glycerin, some rose water and 2 parts per 10,000 of thymol.

Medicate this base as desired.

SMELLING SALTS

R Amm Carb (in small lumps)	..	lb. 2½
Sol of Amm. (Sp. Gr. 0.880)	..	pint 1
Oil of Lavender	..	℥ 45
Oil of Cloves	..	℥ 15
R Sodium Acetate crystals	..	℥xii
Glacial Acetic Acid	..	℥v
Oil of Bergamot	..	℥j
Oil of Rose	..	℥ 40
Oil of Neroli	..	℥ 20
Coumarin	..	gr. 2

Acid smelling salts.

R Potassium Carbonate	..	℥ij
Ammonium Chloride	..	℥viij
Mix and add		
Oil of Neroli	..	℥ 10
Oil of Cloves	..	℥ 5
Oil of Lavender	..	℥ 30
Strong Alcoholic Ammonia	..	℥ 3ss
to	..	..

Then add

Glycerin 5 per cent
to ensure the powder remaining damp.

SMOKE CARTRIDGES FOR TESTING DRAINS

R Potassium Nitrate	3iv
Powdered Resin	3ij
Manganese Dioxide	3ij
Powdered Asphaltum	3j

Mix and fill into cylinders with a fuse.

SOAPS, MEDICATED

Carbolated Soap

R Coconut Oil Soap .. gm.	950
Carbolic Acid gm.	50
Alcohol gm.	25

The carbolic acid is dissolved in the alcohol, and the solution gradually added to the soap.

When the mixture is homogeneous, it is cut and pressed into tablets.

Tar Soap

R Beechwood Tar .. gm.	100
Coconut Oil Soap .. gm.	900

The tar is placed in a mortar, and the soap gradually added, with constant trituration until a uniform mass is obtained, when it is pressed into tablets.

SPONGE POWDER

R Oil of Verbena	m 2
Oil of Lavender	m 10
Sodium Bisulphite	3ss
Sodium Carbonate (dried)	3xvi

Add one teaspoonful to a quart of warm water. Soak, squeezing frequently for half an hour, then rinse well in clean water.

STAINS, REMOVAL OF

ACMS.—Moisten with dilute alkali and rinse thoroughly.

BLOOD: COFFEE.—Soak in several lots of tepid water. Apply hydrogen peroxide or Javelle water. Then soak in hypo solution and rinse well.

DYES.—Soak in methylated spirit, containing, alternately, dilute alkali and dilute acid. Apply, alternately, oxidizing and reducing agents. Rinse very thoroughly.

INK: IRON: RUST.—Apply solution of oxalic acid. If not successful, apply, alternately, solution of ammonia and dilute phosphoric acid.

PAINT: TOBACCO: VARNISH.—Soak in mixture of turpentine, chloroform and oleic acid for some time. Then wash with soap and water.

TAR.—Try a solvent, such as acetone, benzene, ether, petrol or turpentine, finally washing with soap and water.

STAINS ON HAND, METHODS OF REMOVAL OF

A. STAINS MADE BY PERMANGANATE.—

- (1) Wash with a solution of oxalic acid. Afterwards remove the oxalic acid by washing with dilute permanganate solution; or
- (2) Use a solution of pyrosulphite (metabisulphite) of potassium.
- (3) A solution of ordinary hypo (as used in photography) will instantly decolorize permanganate stains, if a small amount of acid is mixed with it at the moment of using.

B. STAINS MADE BY ANILINE DYES.—Dip the hands alternately, several times, in alcohol and in water, to which a few drops of ammonia solution have been added. This method, which depends upon the formation of diffusion currents, will also remove carbolic acid from the skin, and so prevent burns due to accidental spilling of this substance on the hands.

C. STAINS MADE BY IODINE.—These may be removed by washing with any alkali, for instance, by rubbing with a soda-mint tablet and a few drops of water.

TATTOO MARKS, HOW TO REMOVE

1. The skin is first vigorously rubbed until the outer epidermis comes off.

2. Quicklime, just slaked, to the quantity of one pint, is made up into a paste.

3. Two tablespoonfuls of powdered phosphorus are added, and the whole thoroughly mixed.

4. The paste is then applied to the tattooed surface, and held on by a bandage for two days.

5. The bandage is then removed, but the crust is left to dry and fall off by itself in about 15 days.

6. A second application should be made, but a third is rarely necessary. Thus treated, the tattooing disappears completely without the least scar.

TOOTH PASTES

General Excipient for Tooth Pastes

R Glycerin	..	..	..	..	1 part
Simple Syrup	..	..	..	..	1 part

Carbolic Tooth Paste

R Precipitated Chalk	..	℥vj
Orris Root, Powdered	..	℥j
Hard Soap, Powdered	..	℥ss
Carmine	..	gr. 40
Liquefied Carbolic Acid	℥	15
Methyl Salicylate	..	℥ 15
Oil of Peppermint	..	℥ 20
General Excipient.	A sufficiency.	

Thymol and Eucalyptus Tooth Paste

R Precipitated Chalk	..	℥vj
Mag Carb. Heavy	..	℥ss
Orris Root, Powdered	..	℥j
Hard Soap, Powdered	..	gr. 80
Thymol	..	gr. 10
Oil of Eucalyptus	..	℥ 20
Methyl Salicylate	..	℥ 20
General Excipient.	A sufficiency.	
Lemon Yellow.	To tint.	

WATER SOFTENER

R Slaked Lime (in powder)	..	..	..	1 part
Sodium Carbonate (dried)	..	..	..	4 parts

A teaspoonful is stirred up with a large jugful of water and allowed to stand overnight.

WAX, ASEPTIC (SQUIRE'S)

R Beeswax	..	..	..	87 parts
Almond Oil	..	..	..	12 parts
Salicylic Acid	..	..	..	1 part

Heat to 150° C. Keep in sterilized bottles under mercuric chloride solution 1 in 1,000.

WITCH HAZEL CREAM

B Anhydrous Wool Fat	..	..	..	lb. 2½
Almond Oil	..	..	..	pint 1
Melt together on a water bath, and add gradually the following:				
Distilled Solution of Witch Hazel	..	..	..	pint 1
Otto of Rose	.	..	.	℥ 10

MITRAL DISEASE—See Heart Disease.

MOLES

Moles differ from warts in the absence of a papilliform surface, the growth lying beneath the surface epithelium. The pigmented variety may give rise to melanoma, whereas the non-pigmented kinds are frequently the starting point of rodent ulcer. If moles are in a position exposed to irritation they should be removed even if not showing any sign of activity. This may be done either by the knife or CO₂; the latter is very effective, the length of application and degree of pressure depending upon the amount of pigment and tissue in the mole.

MOLLUSCUM CONTAGIOSUM

If the lesions are only a few, they should be cut off with scissors. If the lesions are grouped together, X-ray irradiation is effective. Another treatment is to stir up the contents of each lesion with a needle dipped in carbolic acid.

MORPHIA HABIT—See Mental Disease (Drug Addiction).

MORTON'S DISEASE—See Metatarsalgia.

MOSQUITO BITES (See also Malaria and D.D.T.)

These can be prevented by the following measures:

- (a) Wearing long sleeves and long trousers between sunset and sunrise except when under a mosquito net.
- (b) Mosquito nets.
- (c) Spraying D.D.T. or Gammexane (see also D.D.T.) in all buildings, tents and dark places.
- (d) Pyrethrum spray.

Pyrethrum is the essential ingredient of all contact sprays which kill insects immediately, as distinct from D.D.T., which takes longer to kill, but remains effective for 2-3 weeks once it has been sprayed on a wall. The strength of pyrethrum employed is 1:1,000 or 1:2,000, the former being the usual strength in a kerosene medium and the latter in a watery emulsion. Pyrethrum Extract Concentrate is issued in various strengths, the usual being 1%, 2% or 10%, so the strength must be ascertained before the mixture is made; for instance, if the extract is in a strength of 1% it will be mixed with 9 parts of kerosene or 19 parts of watery emulsion.

An excellent substitute for Flit is the following:

R. Liquid Extract of Pyrethrum	..	..	3ij
Carbon Tetrachloride	..	..	3iv
Oil of Citronella	..	..	3viii
Petrol .. .. .	..	..	3xxii
Add Kerosene Oil (2nd Grade) to make 1 gallon.			

Repellents.—Various formulae, under various trade names, are used; they are effective for about four hours, after which they have to be reapplied if the user has not yet retired under his mosquito net.

The following formula is useful.

R. Pyrethrum Extract Concentrate 1% }	..	aa m 30
Oil of Citronella		
Liquid Paraffin ad .. .. .	..	3j

Instead of liquid paraffin, Vaseline or cold cream may be used; if the concentrate is stronger than 1% a proportionately smaller amount will be used.

Dimethyl pbthalate, a clear, non-greasy fluid, is another good repellent, but may irritate the skin or eyes. "Another drawback is that it is inflammable and is apt to be used by the troops to light fires" (*Field Service Hygiene Notes*, India).

TREATMENT.—Milton and ammonia are the best applications and should be dabbed on the bites. Milton is better because of its antiseptic properties.

MOVABLE KIDNEY—See Kidney, Movable.

MULTIPLE SCLEROSIS—See Nervous System.

MUMPS

Local applications, as a rule, are not of much value, but hot fomentations or glycerin and belladonna may be tried. Feeding may be difficult, but can generally be done out of a feeding cup with a spout; a mouth-wash should be prescribed. Apart from orchitis there are no other sequelae or symptoms of importance. The patient should be put to bed and any erotic excitement avoided; nearly 50% of cases of orchitis progress to complete or nearly complete atrophy of the testis, but fortunately it is seldom bilateral. Convalescent serum may give good results.

MYCOSIS FUNGOIDES

The cause is unknown; in some cases it resembles sarcoma but there are never metastases. The only treatment which is effective is X-ray irradiation.

MYOCARDIAL DISEASE—See Heart Disease.

MYXOEDEMA

TREATMENT.—To begin with, give Thyroideum (*B.P.*) gr. $\frac{1}{2}$ twice a day, increasing the dose until symptoms are abolished; the maximal dose is seldom more than $2\frac{1}{2}$ grains twice a day, a good

average being 1-1½ grains twice a day. Loss of weight is a sign that the dosage is adequate, and tachycardia that it is excessive.

NAEVI—See Moles.

NAIL, INGROWING—See Toe-nail, Ingrowing.

NASAL CATARRH—See Catarrh, Acute Nasal.

NEPHRITIS (See also Laboratory Methods, Simple (Renal Efficiency Tests).)

The frequent and complicated changes in classification are bewildering to the ordinary clinician and of little benefit to the patient, but as correct treatment is influenced by aetiology and pathology these may be considered briefly and simply, and it seems likely that the usual story is somewhat as follows.

The patient acquires an infection, generally streptococcal, of the throat, nose or ear, or even of the skin, the resultant toxins being in part excreted by the kidneys.

Owing to some unknown factor, probably allergic, possibly connected with chill, and happily rare, the glomerular epithelium (see Fig. 27) becomes acutely inflamed some two or three weeks after the onset of the original infection; as the glomerulus is highly vascular, bleeding takes place, causing haematuria and albuminuria; *Acute Glomerular (Haemorrhagic) Nephritis*.

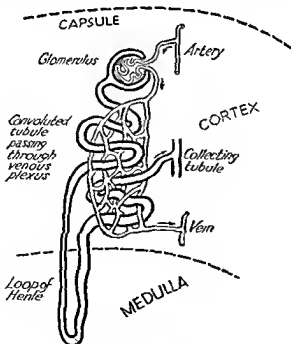


Fig. 27.—Diagram of the structure of the kidney.

As a healthy kidney contains about two million glomeruli and some 30 miles of tubules, it is not surprising that only a fraction of them are in use at any one time, so in the beginning only a fraction of them are damaged; *Focal Glomerular Nephritis*.

The important point about recognizing the above early stages is that adequate treatment can often arrest the disease before it goes any further and thus save the patient from invalidism and death.

Now it has been shown that crystalloids with relatively small molecules can pass through the intact glomeruli without damaging them, but if, like perchloride of mercury, they are irritants and damage the tubules they cause pure *Tubular Nephritis*.

Bacterial toxins are mostly colloids with large molecules, so the intact glomeruli hold them up, but unfortunately get damaged in the process with the result that the glomerular line of defence is breached and the hostile toxins pour into the tubules, causing acute *Tubulo-Glomerular Nephritis*, which is the common severe "acute nephritis" (Large Red Kidney).

A further reference to the diagram will show that damage to the glomeruli must interfere with the circulation of blood through the plexuses surrounding the tubules, which for lack of nourishment undergo lipid degeneration, in addition to being damaged by toxic substances; *Subacute Nephritis* (Large White Kidney); whether this is the same as *Nephrosis* is debated, some pathologists maintaining that tubular nephritis always precedes nephrosis but is not always noticed; they also maintain that if the patient lives long enough, nephrosis will pass through the terminal stages of nephritis. Most pathologists, however, consider that it is a primary degeneration of the tubules or the sequel of a pathological permeability of the glomeruli.

As in all chronic inflammations, fibrous tissue slowly replaces inflamed natural tissue, so the kidney slowly contracts to the Small White Kidney of *Chronic Nephritis*. Fibrous tissue can filter out water but not complicated nitrogenous bodies, so the patient now passes large quantities of pale urine, but retains much urea, uric acid and other toxic bodies, and eventually dies of uraemia.

Two side effects must be mentioned; the body, realizing that it will die in ten days if the excretion of urine is held up, tries to force the blood through the inflamed, thickened glomeruli, so there is a rise in blood-pressure. Further, the exudation and escape of serum albumin, especially in the nephrosis stage, is so great that the osmotic balance between the blood and the tissues is upset, so fluid oozes into the latter, causing oedema.

Although the terminal stages may be indistinguishable either before or after death, it is generally considered that *Nephrosclerosis* or Red Granular Kidney is a separate disease from nephritis, and is both a part of and an important factor in aggravating arteriosclerosis.

TREATMENT.—The treatment of nephritis depends upon the stage that has been reached. In all stages certain basic principles apply, the chief being to rest the kidneys as much as possible and to irritate them as little as possible. The former is achieved by moderate saline purgation and the promotion of sweating, and the latter by avoiding rich foods, spiced foods and alcohol. In *Acute Glomerular or Tubulo-Glomerular Nephritis* there is abundant evidence that chemotherapy is of the greatest use in removing the causative focus and that with reasonable care, blocking the renal tubules with insoluble crystals of sulphonamide does not occur.

Among the sulpha group the drug of choice is Sulphamerazine because of its freedom from crystallization in the tubules, the adult dose being 4-6 tablets (2-3 grammes) initially, followed by 2 tablets every eight hours. If Sulphamerazine is unobtainable, give sulphamylamide, 4 tablets followed by 2 tablets four-hourly. The treatment is continued for 5-7 days. Penicillin therapy may be combined with the sulpha-group treatment.

Other medicinal measures are to give a saline laxative, such as half an ounce of sod. sulph. in water every morning and a bland alkaline mixture such as the following:

R. Pot. Cit.	}	..	..	..	aa gr. 20
Sod Bicarb.	}	..	..	..
Tinct. Hyoscyami	..	..	..	..	m 30
Inf. Buchu ad	..	..	..	..	5]
An ounce to be taken in water 3 times a day.					
Tincture of Digitalis can often be added with advantage.					

Some authorities claim good results from increasing the dose of alkalis up to an ounce or even two ounces in 24 hours, but as there is a danger of alkalosis with its attendant tetany and retention of urea the method should be adopted with caution.

The patient is kept warm and strictly in bed, specimens of urine being examined daily.

Hot packs or Antiphlogistine may be applied to the loins.

If the patient is put under treatment soon after he has noticed the first hæmaturia, this may disappear in a few days and the disease be cured in a few weeks. When things have settled down any obvious septic focus, e.g., in the tonsils, is removed, a "flare up" being guarded against by concomitant chemotherapy.

Vomiting may be treated by the usual methods such as sucking ice, Chlorotone in 5-grain doses, five minims of tincture of iodine in water, or a grain and a half of phenobarbitone, but the condition is apt to be troublesome.

Severe headaches or marked rise in blood-pressure are best treated by venesection, about a pint of blood being removed in an adult. Lumbar puncture often improves the headache.

Oedema.—If the serum-albumin can be increased this will often disappear and modern methods are to give concentrated plasma or one of the albuminous extracts intravenously. In subacute and chronic cases the writer has had success with the cautious administra-

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Oedema.—If the serum-albumin can be increased this will often disappear and modern methods are to give concentrated plasma or one of the albuminous extracts intravenously. In subacute and chronic cases the writer has had success with the cautious administra-

tion of the mercurial diuretics, e.g., 2 c.c. of mersalyl intravenously once a week, but many physicians consider this treatment unorthodox and unsafe. Epstein's high-protein, low-salt diet should be given if the blood-urea is within normal limits; it consists of about 8 ounces of protein, 1 ounce of fat, 8-10 ounces of carbohydrate and about 2 pints of fluid in the 24 hours. In severe cases Southey's tubes may be used, with great precautions against sepsis; the writer has seen as much as 20 pints of fluid drained away by this method.

DIET.—

Acute Nephritis.—In the early stages strict dieting is most important because it helps many cases to recover completely. The best treatment is not to give either food or drink of any sort for the first three or four days. In cool weather, thirst by no means always occurs and may be relieved by sucking an orange or lime. When thirst is really present or when the weather is hot, enough fluid in the form of lime juice or lemonade is given to make the patient comfortable. After the initial starvation period, the amount of fluid should equal the volume of urine excreted in the preceding 24 hours, but if the weather is hot and the patient sweating, two or three times this amount will be necessary. The gradual introduction of fruit into the diet follows, and later, eggs, rice, fish, chicken and bread may be added; salt intake must be kept as low as possible and the return to a nourishing diet should not be delayed too long.

Subacute Nephritis without Oedema.—The amount of protein to be given depends upon the renal function, which is easily discovered by the urea concentration test (see Laboratory Methods, Simple). When urea excretion is low, protein intake must be low, and vice versa. If urea excretion is normal and there is no naked-eye evidence of blood in the urine, the patient can take the amount of protein he is accustomed to, but salt must always be restricted. Milk, eggs and fish provide protein in a harmless form. In all forms of nephritis, alcohol and highly spiced foods are forbidden.

Nephritis with Oedema.—Salt must be prohibited and, if the urea concentration is fair to normal, a good deal of protein must be given to make good the loss through the albumin in the urine. An ordinary diet would consist of fruit, eggs, chupattis or bread, fish or meat, milk, sugar and ghee or butter.

NERVES, DIVIDED

1. In any wound or fracture of the arm or leg examine for injury to a nerve if there is one in the neighbourhood.

2. Never sew up a nerve if there is any danger of infection; it is better to leave it for a month or two, or longer in the case of a compound fracture, until everything is soundly healed.

3. Local anaesthesia is usually better than general.

4. When *delayed suture* is being carried out—

(a) Make a long incision and identify the nerve on each side of the lesion.

(b) Gently free the nerve and see if the ends can be brought

together without tension; this can usually be done by flexing the joints above and below or by altering the position of the nerve, for instance, the ulnar nerve may be brought in front of the elbow. (This is advisable in all cases of ulnar-nerve suture.)

- (c) Cut the divided ends cleanly with a razor blade; if a neuroma is present it must be excised; there are two exceptions to this rule:

- (i) When a neuroma is in the continuity of the nerve and allows impulses to pass.
- (ii) When two neuromata can be brought together but not the nerve ends; the neuromata are then firmly stitched together with the limb flexed and the nerve is gradually stretched by subsequent manipulation; when the stretching is sufficient, a process which may take weeks, the neuromata are excised and the nerve ends stitched together.

- (d) Use the finest silk or thread, and stitch the nerve sheaths together with small interrupted sutures which do not encroach on the nerve fibres. The ends of the fibres must not crush each other; light apposition is all that is required.

- (e) Lay the nerve in a bed of healthy muscle.

5. In a *clean cut*, such as that sustained from broken glass, the wound is powdered with sulphathiazole-flavine and the divided ends of the nerve may be sewn together as in (d) above.

Instead of suture material, "Fibrin glue" made from concentrated serum and chicken extract is used by the specialists with very good results.

NERVOUS SYSTEM (See also Hysteria.)

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For General Paralysis of the Insane see under Mental Diseases, p. 572

In order to dispel the fallacy that diseases of the nervous system are a mystery surrounded by specialists, it is worth considering a

few simple facts of anatomy, physiology and pathology. Only an outline will be attempted; full details will be found in special works and articles on neurology, one of the best of which is that in Price's *Text-book of Medicine*.

Diseases of the nervous system are much rarer in India than in Europe and America, but the reason is not altogether clear; perhaps it is malaria, perhaps climate, perhaps the mode of living and perhaps lack of accurate diagnosis. Two other factors are that syphilis, a common cause of diseases of the nervous system, is a less serious disease here than in Europe and, further, that many nervous diseases have a hereditary element, so have probably been eliminated by the struggle for existence which in peacetime is keener in India than in the West.

CENTRAL NERVOUS SYSTEM

Apart from the "silent areas" of the brain, the central nervous system consists of the sensory, the voluntary motor and the involuntary motor or autonomic system; only the first two will be discussed.

THE MOTOR SYSTEM (See Fig. 28.)

When a purposive movement is made, several things happen :

- An impulse originates in the motor cortex of the brain.
- It passes down through the internal capsule, crosses to the other side in the medulla, runs down the pyramidal tract and then turns into the anterior horn of the spinal cord, where the tract ends around anterior horn cells.

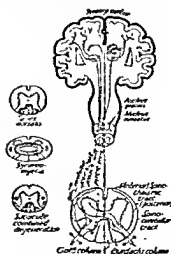
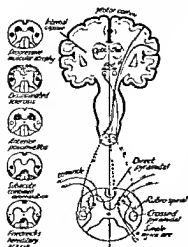


Fig. 28.—The motor path and some of its diseases.

Fig. 29.—The sensory path and some of its diseases.

- (c) The impulse now enters the lower motor neurone by entering the anterior horn cells, from which it runs along the peripheral nerves to stimulate certain muscles and inhibit others. It will be noticed that we say "peripheral nerves" not "nerve"; the reason is that in the cortex of the brain movements are represented, not individual muscles, but at the junction in the anterior horn the appropriate nerves are selected and suitably stimulated so that the right muscles may contract or relax in order to produce the required movement—a truly marvellous "telephone exchange" performance. A moment's thought will show that this must be so; none of us, and certainly none of the animals, will say, "I must contract my biceps, semimembranosus and semitendinosus and relax my quadriceps. I must contract the four layers of muscles, whose names I have forgotten, in the sole of my foot. I must contract my glutei, gastrocnemius, etc." We say, "I must run"—and do so, without knowing anything about anatomy.

THE SENSORY SYSTEM (See Fig. 29.)

If the reader takes an object in each hand and concentrates his attention, he will notice several things:

- (a) What the objects feel like—rough or smooth, heavy or light.
- (b) Whether they are hot or cold, painful or painless.
- (c) Whether they are large or small, and where they are being held in space.
- (d) Whether he can hold the objects without moving his hand.

If the reader can accomplish all these things his—

- (a) Anterior spinothalamic tracts,
- (b) Lateral spinothalamic tracts,
- (c) Columns of Goll and Burdach, and
- (d) Spinocerebellar tracts,

are all intact.

It will also be seen that the fibres conveying the sense of position, whether gross or fine, travel up in the posterior columns and do not cross over until they reach the top of the brain stem; those conveying the sensation of pain and heat cross immediately, and those conveying the sense of touch and pressure cross a few segments higher (indicated by dotted line). Further it will be noticed that all sensory fibres are relaid in the optic thalamus, which is the centre where pleasure and pain enter consciousness. (The Theosophist will note, with interest, that the thalamus may be the focus of the Astral body and the cerebral cortex of the Intellectual body.)

Reflex Action.—For normal reflex action—e.g., the knee jerk—to occur, two things are necessary: the reflex arc must be unbroken and the cortical controlling influence, which is closely connected with the pyramidal system, must be present. If the arc is broken

anywhere, the reflex will not occur, just as an electric light will not go on if the wire is cut; if the cortical controlling influence is removed, the reflexes become exaggerated, just as a horse cannot be controlled if the reins are cut.

We are now in a position to deduce the symptoms of certain diseases of the central nervous system. (See Figs. 28 & 29.)

ACUTE ANTERIOR POLIOMYELITIS

This is an acute virus infection of the anterior horn cells; it used to be thought that the virus was acquired by droplet infection, but it may be swallowed in contaminated food. The nerves of the lower limbs, chiefly of the anterior tibial groups of muscles, are most commonly affected, but the disease may attack any of the anterior horn cells, including those of the phrenic nerves, or the nuclei of the cranial nerves, causing bulbar paralysis.

Some years ago the writer saw a child with a temperature of 105° F., whose blood slides were positive for B.T. malaria, but after three days there was marked laxity and hugging of one side of the abdomen. The two diseases had occurred simultaneously.

Certain features are of interest:

- (a) A pre-paralytic symptom is the extreme crossness and irritability of the child.
- (b) The incubation period is probably between five and ten days.
- (c) Paralysis usually appears on the third day of the disease, *and is maximal at the time of its appearance.*
- (d) Improvement may be expected for three months.
- (e) Response to a faradic (interrupted current) stimulus shows that an affected muscle will recover.

TREATMENT.—The main indications are not to allow affected muscles to be passively stretched, to maintain circulation of blood to those muscles by means of radiant heat, etc., and not to allow the patient's relations to spend large amounts of money on fancy treatments which, however much their promoters may promise, cannot bring to life the dead cells in the anterior horn of the spinal cord.

Electrical stimulation of affected muscles if (see (e) above) they are going to recover, may help.

Paralysis of the diaphragm should be treated by an iron lung or similar apparatus.

Operative measures, such as transplantation of tendons, are not usually undertaken until three years have elapsed.

The Kenny treatment has not given such good results in the hands of others as in those of its enthusiastic originator; the reason for this will be found in the article on Hysteria.

In a temperate climate, the serum of about 75% of adults gives an immune reaction, and convalescent serum or adult serum (10–30 c.c. intramuscularly) may confer a temporary immunity, but it is useless as a means of treatment.

BRAIN TUMOUR

Occasionally this is due to syphilis and is therefore curable, so the blood should be tested in every case.

A careful examination will often give a good idea of where a brain tumour is and this may be confirmed by pneumo-encephalography, in which the ventricles are filled with air, the technique requiring special skill and the resulting skiagrams needing expert interpretation. Removal of a tumour is one of the most highly specialized and difficult branches of operative surgery.

When the classical signs of headache, vomiting and optic neuritis are present, much can be done by the simple operation of *Sub-Temporal Decompression*. A trephine hole is made beneath the temporal muscle, which is dissected off the skull and included in the semicircular scalp flap. The trephine hole is enlarged to about two inches by four inches, all meningeal branches are tied, and a crucial incision made in the dura mater. The flap is then sewn back into place.

Among *Palliative methods* of reducing intracranial pressure, lumbar puncture is dangerous because the base of the brain, already pressed backwards, may be crowded into the foramen magnum, with a fatal result. Cisternal puncture (see under that heading) is safe and may be carried out as an aid in diagnosis and relief of pressure.

Intravenous injection of 30-50 c.c. of 30% salt, or 50% sugar (glucose or cane-sugar) is a good osmotic method of bringing down the pressure. The injection *must* be made slowly, 3 c.c. per minute being the usual speed.

Another method is to run 6 or 8 ounces of 25% mag. sulph. solution slowly into the rectum.

The above are useful also in cases of raised intracranial pressure due to other causes such as injury, inflammation and the hypertensive cerebral attack.

DISSEMINATED SCLEROSIS

Scattered areas, seldom larger than a pea, of temporary inflammation followed by demyelination are present. These areas are disseminated all over the central nervous system, but the eyes, the upper motor neurone and the cerebellar peduncles are generally affected. We thus expect: eye troubles, which take the form of transient attacks of blindness and double vision; weakness of the limbs, with spasticity and exaggerated deep reflexes; and, finally, incoordination, not because as in tabes, the patient does not know where his limbs are, but because they will not move easily and steadily. Other signs are patellar and ankle clonus, both manifestations of the lack of control by the upper motor neurone. The skin reflexes (abdominal and cremasteric) are diminished or absent. Finally, the Babinski (plantar extensor) reflex is present. This is perhaps the most important physical sign in neurology, its presence,

except in habies, being a sure sign that there is interference with the pyramidal system.

The first symptom in disseminated sclerosis is often tingling and weakness of the lower limbs, or some eye disorder such as temporary blindness or double vision; an almost pathognomonic feature is the cheerfulness of the patient in spite of obvious disabilities. The classical triad of nystagmus, scanning speech and intention tremor comes later.

TREATMENT.—This is unsatisfactory, and many methods have gained undeserved credit because of the natural tendency to remission and periodical improvements; pregnancy and cold weather generally have a bad effect. Liver injections seem to improve some cases, and are harmless.

FRIEDREICH'S HEREDITARY ATAXIA

This rare disease is mentioned only because of its interest. It begins before puberty, and may be compatible with fairly long life.

Reference to the diagram will show us what to expect—namely, spastic paralysis, with severe ataxia of the cerebellar and tabetic type. Because the pyramidal tracts are affected, there is a Babinski reflex, but because the posterior columns are affected, the knee and ankle jerks are absent. There is also an association with hammer toes, and the speech has a curious “explosive” quality because of the ataxia of the muscles of articulation.

TREATMENT.—This cannot cure, but something may be done by repetitive re-education to certain useful movements.

GENERAL PARALYSIS OF THE INSANE—See Mental Diseases.

PROGRESSIVE MUSCULAR ATROPHY (Motor Neurone Disease)

This is a disease of both the upper and the lower motor neurones, and the symptoms vary with the parts affected.

If the motor cells in the cortex, and, consequently, the pyramidal tracts, are chiefly involved, weakness with spasticity will be the main symptom, but if the anterior horn cells are mainly affected, weakness, with wasting of the muscles, will be most conspicuous. Generally both upper and lower neurones are affected—amyotrophic lateral sclerosis. The upper limbs usually suffer first and chiefly, or it may be the cervical nerves, causing drooping of the head, or sometimes the cranial motor nerves, causing progressive bulbar paralysis. As the pyramidal tracts are affected, spasticity, exaggerated jerks and a Babinski reflex are present.

The disease is most commonly found in adult males. It has a slow onset, and one of the early symptoms is weakness and clumsiness of the hands. A constant phenomenon is fibrillary twitching of the affected muscles. The patient usually dies within twenty years from the onset, and no treatment of any avail has yet been found.

The hopes that vitamin E would cure the disease have not been fulfilled, but the substance is harmless.

Another method consists in giving calcium gluconate (60 gr. b.d.) before meals in a little milk, with Parathormone (Collip) $\frac{1}{4}$ c.c., b.d. subcutaneously. In a case which reacts favourably, the patient has a feeling of well-being within the first 2-3 days, and measurement of the muscle strengths, e.g., the grip, will show a quantitative improvement within a month. Although the calcium salts are given continuously, we usually give courses of Parathormone over a period of 2 weeks, with a period of freedom of 1-2 weeks until a second course is started. In Werdnig-Hoffmann's disease, two-minim doses twice daily, with calcium and Radiostoleum by mouth, restored one case of ours to complete health. In peroneal muscular atrophy and in amyotonia congenita, calcium salts with vitamin D by mouth have effected satisfactory improvement.

SUBACUTE COMBINED DEGENERATION OF THE CORD

This condition, an accompaniment of pernicious anaemia, has happily become rare since the introduction of liver treatment.

The disease may be confused with peripheral neuritis, and is usually divided into three stages:

- (a) Spastic ataxia, in which the pyramidal, the posterior and the cerebellar tracts are affected.
- (b) Spastic paraplegia, as the pyramidal systems become more and more affected. "Glove and stocking anaesthesia" may be present.
- (c) Flaccid paraplegia as the anterior horn cells begin to be attacked. In this, the terminal stage, incontinence is both usual and troublesome.

TREATMENT.—In any stage, this is by liver injections.

SYRINGOMYELIA

This very interesting disease is a gliosis of the grey matter round the central canal of the spinal cord, the canal becoming greatly enlarged. The condition is most marked in that part of the cord (C.5 to D.3) which supplies the brachial plexus. Once more, reference to our diagram will tell us what to expect. The fibres which carry the sensations of pain, heat and pressure cross in the cord, passing the central canal, so they are destroyed in the swollen gliotic area, with the result that the sensations of pain and heat, especially in the upper limbs, are lost.

Position, sense and ordinary touch, which travel in the posterior columns, are unaffected. The diagram also shows that there is pressure on the pyramidal tracts, so there tends to be spastic paralysis of the lower limbs, while the pressure on the anterior horn cells at the site of the lesion causes lower motor paralysis, with atrophy in the upper limbs.

TREATMENT.—Protect the hands from injury by unnoticed burns, etc. Deep X-ray irradiation to the affected area of the spinal cord arrests the disease in many cases.

TABES DORSALIS

A late syphilitic degeneration, beginning just proximal to the posterior horn cell and affecting the neurones which travel upwards in the posterior columns of Goll and Burdach, and convey the sense of position and vibration.

We therefore expect to find:

- (a) A positive Wassermann reaction in the cerebrospinal fluid.
- (b) Ataxia, due to the fact that the patient does not know where his limbs are in space (consequently he tends to fall when he shuts his eyes).
- (c) Loss of reflexes due to a break in the reflex arc.

These are all found, two further signs being the Argyll-Robertson pupil and a butterfly-shaped area of analgesia on the face; sometimes there is analgesia of the chest and limbs. Optic atrophy is not uncommon.

Tabes dorsalis is uncommon in India.

TREATMENT.—This is considered under Venereal Diseases but the reader may be reminded that at least four million units of penicillin are required together with bismuth and arsenic.

Treatment of special symptoms.—

Ataxia.—Much can be done to improve or even abolish this symptom, Frenkel's system of exercises being the best-known method of treatment; the principle is that if a movement is constantly and frequently repeated the patient learns how to make it. He is told to put his foot or his hand on a certain mark and to go on doing it, he then is made to walk along a straight line and to persevere until he can do it properly, after which he is given crooked lines, and so on. It is not so dull as it sounds because the patient observes his own progress, an excellent psychotherapeutic stimulus.

Lightning Pains.—These are a sign that the disease is active, so treatment must be more so. Morphia is usually not advised because it may lead to a habit (the writer has seen it do so), but relief may be obtained by milder analgesics such as aspirin, Saridone, Cibalgin or other barbiturates, combined with drugs such as phenazone or phenacetin; if an opiate has to be given, codeine is the least noxious.

Optic Atrophy.—This is the most tragic complication and calls for vigorous penicillin therapy combined with artificial pyrexia or malaria. To be both ataxic and blind is a terrible fate, but in such cases the ataxia is often mild or absent.

Difficulty in Micturition.—This can be much improved by a mixture containing strychnine, ergot and belladonna, such as:

R Tinct. Nuc. Vom.	..	..	..	..	℥ 15
Tinct. Belladonnæ	..	..	..	..	℥ 5
Ext. Ergotæ Lq.	..	..	..	..	℥ 15
Aq. Menth. Pip. ad	..	..	..	..	3j

Another remedy is ephedrine, half a grain three times a day, but regular catheterization is often needed.

Perforating Ulcers.—These respond to a combination of general and local chemotherapy.

Charcot's Joints.—These must be relieved of weight-bearing.

HEMIPLEGIA

The common causes vary at different ages:

<i>In Infancy</i>	Birth trauma. Cerebral inflammation after a specific fever such as measles or scarlet fever.
<i>In Adolescence</i> .	Embolism from rheumatic endocarditis, cerebral tumour, or, especially in India, mycotic arteritis by embolism from a small focus in the lung.
<i>In adult life and early middle-age</i>	Syphilis, kidney disease.
<i>In later middle-age and old age</i> ..	Arteriosclerosis and high blood-pressure.

Up to late middle-age, therefore, it may be said that hemiplegia is an incident in some other disease, so need not be further considered here.

The typical attack begins with a "stroke" or apoplectic fit, which the patient will probably survive if it is due to thrombosis, but not if it is due to hæmorrhage. The former is the commoner, but apoplexy is not a cause of immediate death.

The usual cause of the "stroke" is thrombosis of the artery supplying the internal capsule, namely, the lenticulo-striate branch of the middle cerebral. In the course of months or years he has another stroke and perhaps a third, each being followed by rather less recovery and occurring after a shorter interval than its predecessor. Now, just as a tuberculous cavity in the lung may leave an artery unnourished and unsupported, finally leading to rupture and severe hæmoptysis, so each thrombosis is followed by an area of softening, which becomes absorbed, leaving a cyst, across which an unnourished, unsupported artery may be running; if, in due course this artery ruptures, cerebral hæmorrhage occurs and the patient dies a few hours later (not, as used to be thought, instantaneously).

TREATMENT.—

Acute Stage.—Put the patient to bed; if he is unconscious, put his head on one side so that mucus, etc., can flow out of his mouth instead of into his lungs.

The object of treatment is to keep the blood circulating and to prevent extension of the clot; the former is done by giving stimulants such as Coramine, nikethamide, etc., and the latter by the treatment described under Heart Disease (Coronary Thrombosis).

If there is circulatory congestion with cyanosis, it is advisable to bleed the patient (about 12–20 ounces of blood), otherwise this should not be done, because it tends to slow the circulation and hence increase the liability to thrombosis.

Lumbar puncture may cause distinct improvement, and is also helpful in diagnosing between thrombosis and hæmorrhage; fluid

should be withdrawn until it just drips out of the needle and pressure is therefore normal.

Convalescent Stage.—If recovery is going to take place, improvement will be noticeable within three weeks, and if this occurs a cautious but good prognosis is justified. As the paralysis is of the upper neurone type, and therefore spastic, with hypertonic muscles, electrical treatment is useless.

The object of treatment is to restore the use of the paralysed limbs, which is done as follows:

- (a) Make the patient interested in his own recovery and tell him that, as a beginning, he should constantly move the affected limbs by means of the unaffected ones; a little later, having put a limb into a certain position he should try to move it back again by itself.
- (b) Help to move the paralysed limbs, gradually giving less and less help and allowing the limb to do more and more; when it is obviously doing much of the work itself point this out to the patient, who will thereby be encouraged to do more.
- (c) It can be confidently anticipated that power will return in the proximal parts of the limbs before the distal, and in the legs before the arms. As Riddock wisely points out, in a favourable case this prophecy can be made quite safely, to the great advantage of the patient, who thereby gains faith in his doctor and faith in himself—a very powerful therapeutic combination.

THE MUSCULAR DYSTROPHIES

The cause is unknown, some blaming the pituitary gland, others the sympathetic nervous system, and others the muscles themselves. The large fixation muscles are affected, not the small "fine movement" ones.

The disease is familial, and chiefly affects boys, usually beginning at about the age of five years; if the child survives the age of puberty, the genitalia usually remain infantile.

Pseudo-hypertrophic Muscular Dystrophy is the common type, of which the writer has seen several examples in India.

The glutei and calf muscles are chiefly affected, and although they look large, they are composed of enlarged fibres and fat, so have little power. The result is that the child cannot rise from the sitting position without first turning over on his abdomen and "climbing up his own legs."

The disease is slowly progressive and ultimately fatal.

In the *facio-scapulo-humeral type*, atrophy affects the muscles of the face and shoulder girdle, and in the *peroneal type* the peronei; the last-mentioned becomes stationary (see also p. 593).

TREATMENT.—Glycine, in doses of one to three drachms (according to age) three times a day certainly arrests the disease, but it is expensive and not easy to get, so there is always the chance it may have to be discontinued, which is a pity, because cessation of

the drug is followed by a deterioration which is much quicker than if it had not been given at all.

Once these patients become bedridden they go downhill quickly, and soon succumb to some intercurrent infection, so it is advisable to keep them up and about.

MYASTHENIA GRAVIS

This unusual disease is commoner in women than in men, and it is mentioned because it is unmistakable and apparently curable. The essential symptom is that the muscles of the face and body get so quickly tired that they cannot carry out their functions; the tiredness becomes more extreme as the day goes on, and by evening the patient may be unable to stand up, lift her arms, eat, speak or keep her eyes open, so she "droops," the jaw hangs open, the eyes show ptosis—which she may try to overcome by tilting the head back—and the muscles of phonation may be so tired that she cannot speak.

TREATMENT.—Treatment by Prostigmin is followed by great improvement, the dose being 1–2 milligrams intramuscularly, with $\frac{1}{16}$ grain of atropine, four-hourly before meals (to give the patient the strength to eat) or 15 milligrams or more by mouth at the same intervals; $\frac{1}{8}$ grain of ephedrine given at the same time heightens the effect.

The thymus gland is enlarged in most cases, and the operation of thymectomy has been followed by marked and prolonged improvement.

NEURALGIA

NEURALGIA
Neuralgia may affect any group of sensory nerves from the toes (metatarsalgia) to the head (trigeminal neuralgia); in many cases a local cause can be found and treated, but when it cannot we have to rely on other treatment, which, in order of ascending severity, consists of sedatives, injection of local anaesthetics, alcohol injection and, finally, section of the offending nerve or nerves.

Coccygodynia, lumbago, metatarsalgia and sciatica have already been discussed.

SEDATIVES (*see also* Headache).—The following are all effective in certain cases, as are most of the trade-named analgesics made by first-class firms. The warning previously given about the possibility that Pyramidon (amidopyrine) may cause agranulocytosis in susceptible persons should be remembered, and a "check up" white-cell count done if there are any symptoms such as sore throat, or if the drug is likely to be given for long; it is especially dangerous in the old and the debilitated. Pethidine is often effective.

B. Aspirin, gr. 5 o.3 h. (this is more effective and less depressing than larger doses at longer intervals).

B Aspirin. Phenacetin. Amidopyrin.	} 5 gr. 5
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Tincture of gelsemium is a well-tried drug, and Walshe recommends the following mixture:

R Phenobarbiton. Solubile	..	..	..	gr. $\frac{1}{2}$
Phenazon.	..	..	..	gr. 5
Sodii Bromid.	..	..	..	gr. 5
Tinct. Gelsemii	..	..	..	℥ 15
Aq Chlorof. ad	..	..	..	3ss

A tablespoonful every six hours

Heroin and morphia are the most effective of all analgesics, but owing to their habit-forming propensities must be given only in emergencies. The only occasion on which they may be given regularly is when the "neuralgia" is due to an incurable, progressive disease like cancer.

INTERCOSTAL NEURALGIA.—This is often a diagnosis of despair, and is sometimes the first symptom of herpes zoster (*q.v.*). A very careful examination must be made to exclude disease of the heart, lungs, pleura, ribs or spinal column, and diseases of the nervous system associated with girdle pains, such as tabes or syringomyelia. If the sensory nerves of the breast are affected the condition is called *mastodynia* and the patient, after careful examination, generally needs to be reassured that she has not got cancer; lactation and chronic cystic mastitis are often associated with mastodynia.

TREATMENT.—If no local cause can be found, give sedatives and apply a counter-irritant. The condition is usually temporary, but in severe cases the affected nerve or nerves can be blocked with alcohol. A less drastic method is to inject 2% Novocain or Proctocaine into the affected area. Sedatives and vitamin B are also given.

BRACHIAL PLEXUS NEURALGIA.—This is commonly due to injury or to stretching of the nerves.

In all except trivial cases, an X-ray photograph should be taken to exclude arthritis of the shoulder joint and calcification of the supraspinatus tendon.

TRIGEMINAL NEURALGIA.—This is generally considered to be "the worst pain in the world" and has certain characteristics:

It is a disease of middle age.

It is unilateral and attacks are commonest in the daytime.

The early attacks affect the second and third divisions of the nerve, never the ophthalmic division.

The attacks last over periods of days or weeks, and are followed by periods of complete relief, which get shorter as time goes on.

The points at which the branches of the fifth nerve emerge, namely, the supra-orbital, the infra-orbital and the mental foramina are often the starting points of the pain.

TREATMENT.—It is important to be sure that an infected

sinus is not the cause, and that there are no infected teeth, but many of these patients have already had all their teeth out.

In true trigeminal neuralgia the only treatment of real value is the injection of alcohol into the Gasserian ganglion through the foramen ovale; if this fails, the second and third roots are divided and the foramina blocked to prevent reunion, or the sensory root of the Gasserian ganglion is divided. These are operations for the brain surgeon alone—not even the general surgeon and still less the occasional surgeon—but injection of alcohol can be carried out by a general surgeon if first he carefully practices on a skull and then on a cadaver. It is important to inject the alcohol right into the substance of the ganglion.

A recent "neuralgia" affecting the ophthalmic division of the fifth nerve suggests herpes ophthalmicus, the treatment of which is discussed under "Eye."

Occasionally a severe neuralgia affects the cervico-occipital region and must be distinguished from occipital headache.

PERIPHERAL NEURITIS

With fortunes being made out of vitamins, peripheral neuritis has attained great notoriety in recent years, and the fact that it is often diagnosed when not present is more flattering to the advertiser than to the physician, and more beneficial to the manufacturer than to the patient.

At a certain stage in carbohydrate metabolism, pyruvic acid is formed, and for its further breakdown vitamin B is essential, otherwise it accumulates and attacks the peripheral nerve fibres. In "natural" carbohydrates, sufficient vitamin B (thiamine) is provided to break down the pyruvic acid, but, when, as in polished rice, this is removed, replacement is necessary, otherwise peripheral neuritis in the form of beri-beri will develop. Yeast is the richest source of natural vitamin B, and one of the cheapest.

Peripheral neuritis can also be caused by failure to absorb vitamin B, as in chronic alcoholism and certain cases of achlorhydria and sprue; it should then be given by injection. The prolonged taking of the liquid paraffin group of laxatives also tends to prevent adequate absorption of vitamins.

The usual classification of peripheral neuritis is into:

- | | | |
|------------------|----|---|
| <i>Toxic</i> | .. | Alcohol, arsenic, lead and, occasionally, sulphonamides and certain rarer substances. |
| <i>Metabolic</i> | .. | Beri-beri, neuritis of pregnancy, pink disease, starvation. |
| <i>Infective</i> | .. | Acute infective polyneuritis, diphtheria, leprosy and, possibly, the rare Landry's ascending paralysis. |

In general, the treatment of peripheral neuritis is to remove the cause whenever possible, to guard against cardiac and respiratory failure (tachycardia may be extreme, and respiratory failure may need an iron lung). Vitamin B should be given in a form in which it will be absorbed; the maintenance dose is 3–6 mg. of thiamine a day, but therapeutic doses may be at least ten times as great.

PROLAPSED DISC

ANATOMY.—In nearly ever case the disc between L.3 and L.4, L.4 and L.5 or L.5 and S.1 is at fault.

HISTORY.—The patient is usually a man between 30 and 40 years old, who often gives the history of sudden pain in the back, followed by pain in the leg after or while lifting a heavy weight with his back bent; sometimes he says, "I felt something give". Sometimes he has had a fall or other injury, and sometimes there is no relevant history. The pain may be made worse by sitting down, coughing, sneezing or straining at stool.

EXAMINATION.—Weakness or absence of the ankle jerk on the affected side is the most constant single sign, and there may be slight wasting of muscles, and pain on stretching the nerve. Careful examination often reveals partial analgesia to pinprick, over the areas supplied by the affected nerves. The sole and the outer side of the foot are supplied by the 1st and 2nd sacral nerves, the rest of the foot and the outer side of the calf by the 4th and 5th lumbar, and the inner side of the calf by the 3rd and 4th lumbar, so if analgesia to pinprick is present it is possible to deduce which disc is affected.

X-ray Examination.—Plain antero-posterior and lateral views may be helpful by showing a diminution in the intervertebral space at the affected disc. Intrathecal Lipiodol has been largely given up, because its late results were sometimes worse than the disease; the usual procedure now is to draw off cerebrospinal fluid and replace it by sterile air, but the resulting pictures are not so clear as are those with Lipiodol.

SCIATICA

The discovery of Prolapsed Intervertebral Disc has changed our ideas on the pathology of sciatica, but now that the overstatement which accompanies every new discovery has died down, it seems probable that prolapsed disc is the cause of about 30% of the cases of true sciatica; some 50% are due to fibrositis, osteoarthritis (of hip, spine or sacro-iliac joint), coxa vara, tumours or inflammations involving the nerve, its branches or its components (4th lumbar to 3rd sacral), congenital defects, or old injuries, particularly those causing asymmetry, and various odd causes, such as recent injury, diabetes, chill, hysteria, gout and a septic focus; in the remaining 20% a cause cannot be discovered. Lack of vitamin B is not a factor.

TREATMENT.—Rest in bed cures most cases; if there is no marked improvement after two weeks a plaster-of-Paris bandage should be applied so as to immobilize the spine (for method of application, see *Fractures of the Spine*); this has the advantage of allowing the patient to get about. If this fails, removal of the herniated piece of disc should be considered. A method which the writer has found successful in many (but by no means all) cases of

sciatica is to inject 100 c.c. of sterile normal saline into the sacral canal. This is done as follows:

- (a) With the first finger of the left hand locate the two cornua of the sacrum which mark the lower end of the canal.
- (b) Inject some local anaesthetic.
- (c) Starting from a point about half to one inch distal to the cornua, insert a fine lumbar-puncture needle.
- (d) Keeping it nearly parallel to the surface of the skin, push the point into the sacral canal for $2\frac{1}{2}$ inches (if the point is in the canal it travels easily and cannot be felt beneath the skin).
- (e) Withdraw the stylette and make sure that no cerebrospinal fluid escapes.
- (f) Attach the syringe and try to pull out the plunger in order to confirm that cerebrospinal fluid will not come out.
- (g) Slowly inject 80-100 c.c. of sterile normal saline. The patient generally complains of pain, but this soon passes off.

Russell Brain suggests that when this method is successful, it works by moving one of the nerves into a position where the prolapsed disc does not press on it. The injection can be repeated two or three times at weekly intervals.

When the cause of the pain is fibrositis, it is generally possible to locate one or more tender spots in the muscle; also the condition is often bilateral, which it seldom is in true sciatica. If tender spots can be found, 10 c.c. of 2% Novocain or 5 c.c. of Proctocaine should be injected into each.

Infra-red rays, diathermy, iodine, liniments, Thermogene wool and mustard plasters are other adjuvants to the treatment of sciatica; of drugs, aspirin, phenazone and phenacetin are the most popular—potassium iodide is useless.

Injection of normal saline (about 50 c.c.) or oxygen into the nerve may also be tried.

There is a general tendency for attacks of sciatica to get less severe as time goes on.

SYPHILIS OF THE NERVOUS SYSTEM

The great interest of this disease lies in its curability, which is more than can be said for other diseases of the nervous system. In all doubtful cases, therefore, no harm and occasionally much good can be done by testing the blood or cerebrospinal fluid or by applying one of the therapeutic tests.

SYPHILIS OF THE BRAIN.—Syphilis attacks the brain in four different ways: it may cause inflammation of the meninges, thrombosis of the arteries, a gumma, or degeneration of the cortex, these lesions being roughly early, not-so-early, late, and very late respectively.

Syphilitic Meningitis occasionally begins in the secondary phase of the disease, when it is apt to be acute, especially in young adults. The cerebrospinal fluid shows a lymphocytosis and the blood a positive Wassermann reaction.

More commonly a posterior basic meningitis occurs during the

early tertiary stage. It is ushered in by deep-seated intractable headache and, being at the base where the cranial nerves are, is often accompanied by cranial nerve palsies, especially of the motor oculi and facial group. (*N.B.*—When a patient has a severe headache and recent squint, remember syphilis.)

Syphilitic Thrombosis of a Cerebral Artery is the common cause of paraplegia between the ages of 30 and 45 years.

Gumma of the Brain is a rare form of cerebral tumour, and *Cortical Degeneration* causes G.P.I.

SYPHILIS OF THE SPINAL CORD.—This occurs as a meningo-myelitis and generally begins with root pains which may be of a girdle type. The condition may closely mimic progressive muscular atrophy, even to the fibrillary tremors of the muscles, due to pressure on the upper and lower motor neurones; an Argyll-Robertson pupil may be present. (*N.B.*—Test the pupils and the blood in a case of progressive muscular atrophy, especially of the amyotrophic lateral sclerosis type.)

Acute syphilitic meningo-myelitis, with paralysis below the lesion, which is usually in the dorsal region, may be so severe as to mimic transverse section of the cord. When, therefore, such symptoms occur without a history of injury and with nothing to suggest spinal caries or tumour, no harm can be done by giving anti-syphilitic treatment as soon as blood has been taken for a Wassermann test.

Tabes dorsalis has already been described.

Finally, syphilis, like tubercle, may affect the bodies of the vertebrae.

EXAMINATION OF THE NERVOUS SYSTEM

If the optic discs, the knee jerks and the plantar reflexes are normal, the central nervous system is probably normal (Adie).

The following is a quick and systematic method of examining the nervous system, which will not miss anything important.

CRANIAL NERVES.—

- (1) *The olfactory nerves.*—These may be examined by testing the sense of smell, but this is generally unnecessary.
- (2) *The optic nerves.*—Look at them with an ophthalmoscope. A good idea of the fields of vision is obtained as follows: Look at the patient's nose and tell him to look at yours, then spread your hands apart and move them slowly round, twiddling your fingers all the time. If you are conscious of seeing the movement the patient should be too. Diminution suggests, amongst other things, pituitary enlargement.
- (3) *The motor-oculi, (4) the trochlear and (6) the abducent nerves.*—First test the reaction of the pupils to light, and then hold up your finger and tell the patient to look at it; now move it slowly in all directions.
 - (a) Look carefully at the movements of the patient's eyes to see if they follow the finger.

- (b) Hold the finger first to one side then the other, looking for nystagmus.
- (c) Move the finger away from the eyes, when the pupils should dilate, and then close to the eyes when the pupils should contract and converge (the absence of this makes one think of old encephalitis). An isolated lesion of the 6th nerve may occur when the intracranial pressure rises; the nerve has a long straight course from the back to the front of the skull, and gets stretched.

(5) *The Trigeminal Nerve.*—

Motor branch.—Tell the patient to close his jaws tightly.

Sensory branch.—Test the corneal reflexes with a small piece of paper or the head of a pin or match.

- (7) *The Facial Nerve.*—Tell the patient to show you his teeth or to smile; then tell him to shut his eyes tightly and see if you can open them with your thumbs.
- (8) *The Auditory Nerve.*—Stopping one of the patient's ears, whisper in the other, "Can you hear all right?" If he answers "Yes," repeat the process on the other side.
- (9) *Glossopharyngeal Nerve.*—Tell the patient to swallow, and watch his thyroid cartilage. If there is any suggestion of disease, test the taste on the posterior part of the tongue by means of a tablet of quinine or anything bitter or salty held in a pair of forceps.
- (10) *Vagus Nerve.*—Tell the patient to say "Ah," and watch the movements of his palate.
- (11) *Spinal Accessory Nerve.*—Tell the patient to turn his head against resistance, and feel the sternomastoid muscle, then tell him to shrug his shoulders. (The ninth, tenth and eleventh nerves are generally involved together if a lesion affects one of them.)
- (12) *Hypoglossal Nerve.*—Tell the patient to put out his tongue.

At first sight the above examination looks formidable; actually it takes about two minutes to carry out.

- (13) The Cranial Nerves having been examined, proceed as follows: Test the biceps jerk (Cervical 5 and 6) and the triceps jerk (Cervical 6 and 7); the abdominal (Dorsal 7-12) and cremasteric reflexes; the knee jerks (Lumbar 2-4) and the ankle jerks (Sacral 1-2); carefully test the plantar reflexes and examine the patellae and ankles for clonus.
- (14) Now test the power of the patient's muscles by giving him one finger of each hand to squeeze, and then make him raise his knees against pressure.
- (15) Test his co-ordination by making him slowly touch the tip of his nose, first with his eyes open and then with them shut. If intention tremor is present, this will show it; it also shows whether the patient knows where his limbs are

in space; the test may be followed by telling him to keep his eyes shut and to touch one knee with the other heel. He may also stand up with his eyes shut.

- (16) *Sensory Test*.—In India, where leprosy is common, the light-touch test must be carried out carefully. The best way of doing it is to tell the patient to shut his eyes, and then to touch him lightly with a piece of cotton-wool or paper over various parts of the body, telling him to put his finger on the place touched.

For tactile discrimination, the blunt and sharp ends of a pin may be used; and to test heat and cold sensibility, two test-tubes, one containing hot and the other cold water.

Deep sensibility is tested by squeezing various muscles, which are tender in peripheral neuritis.

NEURASTHENIA (*See also Hysteria and Mental Diseases.*)

People in the tropics are prone to suffer from neurasthenia, as apart from general causes, such as worry, overwork, focal sepsis, and sexual neuroses, there are the special conditions of great heat, excessive light, depressing environment, separation from family, isolation, poor food, lack of exercise, debility from malaria, dysentery, enteric fever and amoebiasis.

As regards treatment, one of the most important points is prophylaxis by giving a prolonged period of leave after acute infections, accidents and operations, especially abdominal; the patient thus spends his convalescence entirely free from the worry and responsibility of his work in a good climate with good food of a high vitamin content.

Once the cause, if possible, has been ascertained and removed, if improvement does not take place, the only course is to give long leave, and if two years fail to cure and the patient is in one of the services, he will probably have to be invalided out. It has been especially recommended for the tropical form that the patient have hot baths before going to bed and sodium glycerophosphate 0.1 gramme hypodermically every day, or one of the following:

R. Strychnin. Arsenatis ..	gr. $\frac{1}{2}$	R. Zinci Phosphid. ..	gr. 2
Calcii Glycerophos. ..	5ss	Ext. Nuc. Vom. ..	gr. 2
Syrup Aurantii ..	3ij	Ext. Cannabis Ind. ..	gr. 2
A teaspoonful in a wineglassful of wine after each meal		Make 24 capsules; one every 3 hours.	
R. Ext. Sumbul. ..	gr. 2	R. Phosphori ..	gr. $\frac{1}{16}$
Ext. Valerianae ..	gr. 1	Ferr. Glycerophosph. ..	gr. 2
Ext. Cimicifugae ..	gr. $\frac{1}{2}$	Ext. Cannabis Ind. ..	gr. $\frac{1}{2}$

One pill twice daily.

One pill twice daily.

R. Bromalm ..	gr. 10-30
Syrup. ..	QJ
Aqua. Anisi ad ..	3j

Sedative.

NIGHTMARE

Patients who suffer from this condition should sleep on a hard mattress with light bed-clothes, but at the same time keeping the feet warm. Late heavy meals and constipation should be avoided.

NIGHT TERRORS

Children who suffer from this condition generally have adenoids, an error of refraction, mucous disease, threadworms or some other source of chronic irritation. They are generally highly-strung, neurotic children who should be prevented from dwelling on their terrors and protected from books, stories and sights which might increase their emotions. The digestion should be attended to, and a dose of bromide, or bromide combined with chloral, given at bedtime.

NIPPLE, CRACK OR FISSURE OF (*See also* Breast, Diseases of.)

These are commonest with a first baby, but may recur in subsequent puerperia.

PREVENTION.—During the last three months of her pregnancy the patient should massage the nipples with slowly increasing firmness night and morning; at night lanolin, cold cream or Vaseline should be used, and in the morning some form of spirit; if the nipples are retracted they should be drawn out.

Before the milk comes in (i.e., for about the first 48 hours) do not allow the child to suck for more than two minutes at each breast.

At the end of each feed the nipples must be carefully dried and swabbed with a little spirit.

TREATMENT.—A nipple shield must be used, the hole in the teat of the shield being large, otherwise the child has to overcome both the resistance of the breast and that of the teat.

Carefully dry the nipples after each feed, then apply a couple of drops of Tinct. Benzoin. Co.

If the nipples are painful, Nupercainal ointment is very soothing.

The great danger is that of abscess; this can often be prevented by giving the patient two tablets of sulphadiazine three times a day.

In severe bilateral cases, it may be necessary to stop breast feeding (*see* Lactation).

NOSE, DISEASES OF

The commonest disease of the nose, namely the common cold, has already been dealt with under Catarrh, and the second commonest under Epistaxis.

Chronic inflammation is generally kept up by infection of the paranasal sinuses, which open into the nose at the places shown in the diagram. Although a chronic infection of one sinus or group of sinuses—e.g., the frontal—often occurs, it is common for several to be affected, and of all groups the ethmoidal sinuses are perhaps the most commonly affected and the most difficult to cure.

EXAMINATION OF THE NOSE.—A head-light or head mirror is essential.

Seat the patient opposite you, tell him you will want to move his head with your hand, and instruct him to blow his nose.

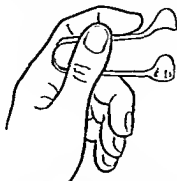


Fig. 30.—Method of holding a nasal speculum.

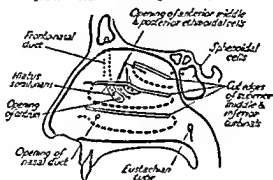


Fig. 31.—The lateral wall of the nose.



Fig. 32.—Structure of the nasal septum.

Holding the speculum as shown in Fig. 30, press the blades together and insert it in the patient's nostril, allowing the blades to open as much as is needed, and shining the head-light into the nose. If there is congestion, spray the nose with adrenaline or adrenaline and cocaine.

The inferior turbinal is the first thing to be seen, the middle one coming into view when the patient's head is tilted back; on the medial side, of course, is the septum, which is inspected for deviation. The superior turbinal cannot be clearly seen from the front, but posterior rhinoscopy with a special instrument rather like a cystoscope shows it well. If pus is escaping from one of the sinuses it flows over the inferior turbinal except in the case of the posterior ethmoidal cells, when it flows over the middle turbinal. Pus emerging from the sphenoidal cells cannot be seen from the front because it is too high up and too far back.

Transillumination is carried out in a pitch-dark room by putting a light in the patient's mouth and noticing whether the light shines through both sides equally. This is useful for antrum and ethmoid cases; opacity means inflammation or growth, but translucency does not exclude inflammation. The observer must sit in the dark for at least five minutes before making the examination. The frontal sinuses can be examined by applying the torch to the supra-orbital margin, but the results are not very trustworthy.

X-ray photographs are the most valuable means of detecting sinus trouble, but to be of real use they must be taken by an expert.

CHRONIC INFLAMMATION OF THE NOSE

This, as already remarked, is generally due to sinus infection, which must be dealt with if a cure is to be effected.

OZAENA

This is a particularly unpleasant form of chronic sinusitis because of the awful smell.

Treatment is by chemotherapy, and the administration of oestrogens by injection or by mouth.

IRRIGATION OF THE NOSE

This must be carried out with the patient keeping his mouth wide open and breathing in and out through it hard; otherwise he may choke and force fluid into the sinuses and middle ear. Normal saline solution or one part of Glycythymoline to three of water are useful solutions.

Nasal Sprays of the de Vilhiss type are most useful, and enable medicaments to reach all parts of the nose.

Snuff in the form of Cibazol or sulphathiazole powder, preferably with 100,000 units of penicillin to 30 grains of powder, is the best local antiseptic application; it should be sniffed up the nose three or four times a day, after meals; it is also useful for tonsillitis.

ACUTE PARANASAL SINUSITIS

This usually occurs within ten days of a cold or an attack of influenza, and is characterized by pain and a feeling of fullness in the affected area, above the eyes, between the eyes, or in the cheek, according to whether the frontal, the ethmoidal or the maxillary sinuses (antrum) are affected. The sphenoidal sinus is seldom acutely inflamed, perhaps because its drainage is better than that of the

others, but deep-seated retro-nasal or occipital pain is one of its characteristics.

The pain from sinus inflammation is almost always worst in the morning, when it may be agonizing, but it fades away about noon.

TREATMENT.—Chemotherapy is by far the most efficient method, and injections of penicillin combined with a sulpha drug by mouth will often clear up the most acute sinusitis in 24 hours, but treatment must be carried on for longer than this, the sulpha drug being given for at least 5 days, or the inflammation will return.

Local treatment consists of applying soothing lotions or constrictive drugs such as ephedrine, menthol, Benzedrene, Privine, or adrenaline with the object of opening up the natural apertures of the sinuses and thereby promoting drainage (for various formulae see Catarrh, Acute Nasal). An old favourite of the writer's is:

R. Menthol. ʒj
 Spirit. Vini Rect. ad ʒi
 A few drops to be dropped on some very hot water
 and the vapour inhaled four times a day (the
 patient keeping the eyes shut).

OPERATIVE TREATMENT

In general, intranasal surgery is a task for the specialist, armed with special instruments, but certain operations are easily carried out successfully by a competent general surgeon.

Local Anaesthesia must be adequate, and must be combined with adrenaline otherwise the operation will be both painful and bloody. A piece of cotton-wool twisted round a thin bamboo swab-stick and soaked in 10% cocaine solution containing 2% of Liquor. Adrenalin. Hydrochlor. should be applied to the area for at least 15 minutes before the operation.

Antrum Puncture gives great relief, and is carried out as follows:

- (a) Tuck the cocaine-adrenaline swab (see previous paragraph) under the inferior turbinal bone and remove it after 15 minutes.
- (b) Using a head-light or mirror, insert a nasal speculum.
- (c) Take a wide-bore lumbar-puncture needle and pass the point under the inferior turbinal bone for about $\frac{1}{4}$ inch.
- (d) Remove the speculum and, keeping the point of the needle in place, carry the butt of the needle to the opposite side; the shaft of the needle thus presses and deflects the septum, and the point points towards the orbit on the affected side.
- (e) Push the point of the needle gently but firmly into the antrum, through the thin plate of bone under the inferior turbinal.
- (f) Apply a Record syringe to the needle and try to aspirate pus, then fill the syringe with saline and irrigate the antrum several times until the fluid returns clear.
- (g) Inject 2 c.c. of distilled water containing 10,000–20,000 units of penicillin.

Cauterizing the Middle or Inferior Turbinals.—

- (a) Anaesthesia and speculum as above.
- (b) Make sure there is no ether about.
- (c) If an electric cautery is available, use it and thoroughly scarify the mucous covering of the enlarged turbinal. If an electric cautery is not to hand, take an ampoule file or a Kirbigrip in a pair of artery clips, fixing it at angle, then heat it red hot and apply it to the affected turbinal, being careful not to touch the skin at the edge of the nostril.

Removing the Anterior End of the Middle or Inferior Turbinal can easily be done with a stout pair of pointed scissors, the bone being gripped in a pair of artery or Kocher's forceps.

The anterior end of the inferior turbinal is removed in opening up the maxillary antrum, and the anterior end of the middle turbinal in draining the anterior ethmoidal cells or as a preliminary to opening or irrigating the fronto-nasal duct. The modern method of opening up the ethmoidal cells is through the orbit, but it is an operation for the specialist.

Deflected Septum, if causing obstruction, is dealt with by sub-mucous resection, not a difficult operation but best done by a specialist. The operation is not recommended for children. A similar effect can often be achieved by cauterizing or removing part of one of the turbinals.

Broken Nose.—If the patient is seen early, reduction can generally be accomplished by Watson-Williams's method; he pads the blades of a septum or other suitable forceps with strapping, puts one blade inside the nose and the other outside, and manipulates the nasal bones into position in turn, first disimpacting each bone by giving it a gentle twist outwards. The nose can be packed with Cihazol-ointment gauze, or a triangular wire splint inserted.

A general or intravenous anaesthetic is required for the manipulation.

SPECIFIC ULCERATION

Specific ulceration of the nasal mucosa is described under the causative diseases—e.g., Leprosy and Diphtheria.

LUPUS OF THE NOSE

Lupus due to the tubercle bacillus has been successfully treated in France by large doses of calciferol (crystalline vitamin D).

MALIGNANT DISEASE OF THE NOSE

This requires the same treatment as malignant disease elsewhere. As it is often amenable to radiotherapy, the patient should be sent to a place where experts can give this.

FOREIGN BODIES IN THE NOSE

Unilateral discharge of pus from a child's nose is almost pathognomonic of foreign body. The treatment is to give the child an anaesthetic and remove the foreign body with a pair of angled forceps or by passing a squiot hook behind it and drawing it out.

Foreign bodies far back may be pushed into the nasopharynx, but must be caught there, not allowed to fall into the larynx.

RHINOPHYMA

This very disfiguring condition is due to over-action and blockage of the sebaceous glands of the nose, generally following on chronic hyperaemia due to over-indulgence in alcohol and over-exposure to wind and weather.

TREATMENT.—

In the early stage.—As the disease is often associated with rosacea, riboflavin (vitamin B₂) may be given by mouth or in doses of 2 mg. intravenously three times daily. X-rays and radium locally are often effective.

In the later stages.—The hypertrophied tissue should be shaved off until the nose is of normal shape. The islets of the epithelium left by the ducts soon spread, and the nose is covered with skin. Bleeding is severe during the operation but is checked by adrenaline, Coaguleo-Ciba, pressure or Thrombin Topical.

NURSING

GENERAL NURSING

Complete rest in bed is essential for a very ill patient, and the nurse must prevent exertion of any kind. It should be her pride to anticipate any desire of her patient.

Ventilation in India is not always easy. The aim is to have plenty of fresh air without draught. A draught is easily caused by a half-open door or window, the smaller the opening through which the air rushes the greater the draught. Aim at keeping the temperature between 65° and 80° F.

Humidity in most places in the hot weather is high. Try to keep the air moving with the aid of fans.

Heat can be very trying in India; try to lessen it by:

Fans or air-conditioners

Drawn curtains

Wet kuss-kuss tatties

Open doors and windows, except in the heat of the day

Light porous clothes and bed-clothes

Cool blanket baths when permissible.

THE BED.—Most hospital beds are of the Lawson Tait type, narrow, at a convenient level, and with a firm spring-mattress. In many cases there is a Fowler position attachment.

Mattresses should preferably be of coir, as it is cooler than cotton and can be sent to the autoclave for sterilizing. Mattresses can also be of kapok, cotton or Dunlopillo rubber. The latter can be disinfected with carbolic lotion (1 in 20). All mattresses should have a washable cover, and for a Dunlopillo a mackintosh case. Over the mattress:

A long mackintosh

A sheet large enough to tuck in all round the mattress

A draw mackintosh (1 yard by $1\frac{1}{2}$ yards)

A draw sheet (1 yard by $3\frac{1}{2}$ yards)

A firm pillow, with cover and pillow-case

A soft pillow.

No mattress should be left without its cover—it is easier to wash a cover than to renew a mattress.

HOT-WATER BOTTLE.—Preferably rubber, but may be zinc, stone, aluminium, glass or copper. Only fill three-quarters full with water, expel air, hold it upside down to see if it leaks, fasten stopper firmly, and put on a thick cover. *Do not place next to the patient*—a bottle burn is a disgrace to any nurse.

AIR BED, WATER BED, DUNLOPILLO AIR CUSHIONS.—These must not be put in the sun, nor near oil, pins or heat. Used to prevent pressure sores in elderly, incontinent, operation, malnutrition, or adipose patients. They must have a blanket underneath and a blanket over to protect the rubber.

BLANKET BATH.—Have everything ready before you start: soap, sponge, towels, nail brush, Eau-de-Cologne, powder, two bath blankets, and clean clothes. Roll the patient to one side, put the bath blanket under him, then turn him back and unroll the blanket on the other side. Cover with the second blanket. Wash the patient from above downwards, do the front before the back and expose only a small area, e.g., one limb, at a time; dry each area as soon as it is washed. If the patient is able to wash his own private parts allow him to do so in solitude after the rest of the bath has been given. See that the room and the water are warm, and turn off the fan if one is running.

PRESSURE POINTS.—These are back of the head, back of the shoulders, elbows, sacrum, hips, between the knees, over the knees, between the ankles, over the heels. Give massage four-hourly in a "confined to bed" patient, with soap and water—it is the friction that is necessary to keep the blood circulating. A common error in this country is only to rub with spirit and powder, but the massage with the soapy hand is much more important. Then rub with spirit to harden the skin, and over this apply powder to dry up moisture—moisture is very conducive to a pressure sore.

The position of the patient should be changed every four hours or more often when the patient is very emaciated or very fat. Keep the bed-clothes free from creases, or the debris of meals. Patients after operation must not be turned or moved by one nurse; there must always be two for the first three days.

CARE OF THE MOUTH.—A dirty mouth is a disgrace to anyone taking care of a patient. Remove artificial teeth, clean them with a brush and place in cold water until needed again. Clean the mouth with swab-sticks if the patient is very poorly, or with cotton-wool on the end of a toothpick, or held by forceps. The wool should be dipped into the mouth wash.

For a very dirty mouth use peroxide of hydrogen (4 drachms to

a glassful of warm water). For a dry mouth leave a coating of glycerin over the tongue, the gums and the lips—glycerin attracts fluid, so it keeps the mouth moist.

RECORDS.—

Temperature, pulse and respiration should be recorded 4-hourly or more according to the needs of the patient.

Bowel action—recorded b.d.

Urine—recorded if there is anything abnormal according to the doctor's wishes.

Vomit should be measured and recorded, and saved for doctor to see.

Bleeding should be recorded and all clots, etc., saved for the doctor to see.

Injections should be recorded on the chart.

A medicine book should be kept and when the ordered dose has been given it should be marked off in the medicine book—then no mistake will take place when the nurses are changing duties.

Sleep should be reported, and in the case of a patient with insomnia it should be recorded on the T.P.R. chart.

A report should be kept of every patient until the day of discharge.

DIET.—This varies considerably according to the disease.

Fluid Diet.—Fluid usually given at two-hourly intervals—milk, cocoa, tea, coffee, Ovaltine, Benger's Food, Horlicks, whey, barley water, orange juice, lime juice, pineapple juice, mango juice, bael-fruit juice (for diarrhoea), green coconut juice, pomegranate juice (for diarrhoea), egg flip, egg nog, or any other fluid that the nurse's ingenuity can manage from what the patient is allowed to have.

Variety will make the patient drink more and with greater appetite, whereas monotony of diet may kill the appetite. Do not waken a patient from sleep for a drink, unless by doctor's orders; it can be given when the patient awakes.

Semi-solid Diet.—Egg custard, kitchree, creamed potatoes, creamed tomatoes, jelly, ice cream, chocolate, bread and milk, milk puddings, strained porridge, sujee, sago, tapioca, arrowroot, thick Benger's Food.

Light Diet.—Creamed chicken or fish, fricassée, mashed potatoes, creamed vegetables, chicken or fish in any form, light puddings, soups, but no meat, or vegetables with a lot of roughage.

Full Diet.—Usually anything that the patient likes, but in smaller quantities than when he is up and walking around.

Much can be done by the nurse to improve the appetite of the patient by clean, daintily served trays, variety of foods, pleasant surprises, small amounts and clean napkins. Sometimes a patient will not eat because he is afraid of spilling it on the bed-clothes, or on himself. See that a napkin is conveniently placed for the patient's protection and comfort.

WHEN ALLOWED OUT OF BED.—The first time the patient is allowed out of bed he must be assisted by the nurses. He must not be allowed to walk about unless the doctor has given permission—the first day may be a very tiring one. The patient may have an inclination to faint as he may have been in a recumbent position for many days. Keep him quiet and let him get up slowly—do not allow him to excite himself.

VISITORS.—Visitors can be very tiring to the patient and he may be too polite to say anything. It is the nurse's duty to limit the visitors to the strength or wishes of the patient. After operation, the fewer visitors the better and not more than two at the bedside at one time—the patient cannot cope with them in his weakened state and it worries him not to be able to talk to them. The nurse must be tactful but firm, where her patient is concerned.

MEDICAL NURSING

RESPIRATORY DISEASES.—Admit plenty of air without draughts, keep a warm, even temperature. Observe specially, cough, expectoration, respiration, pulse, temperature, dyspnoea, cyanosis, amount of sleep, pain, amount of fluid taken, and amount of urine passed. These should all be charted.

During the acute stage the patient should not exert himself in any way by moving or talking. He must be warmly but lightly clad. A cotton-wool or a gamgee-tissue jacket is necessary for pneumonia and bronchitis. Poultices of linseed may be ordered every four hours, but this treatment has been superseded by applying Antiphlogistine poultices every day. The Indian equivalent of this is known as Antiflamio.

If there is dyspnoea the patient should be propped up and well supported by pillows and back rests. Tepid sponging may be ordered for the relief of pyrexia. Enemata may be ordered instead of aperients to relieve the patient of straining at stool.

HEART DISEASE.—Get full instructions in all cases from the physician concerning the stimulants he would like to be given in case of emergency. Great tact, patience, ingenuity, gentleness, encouragement, and keen observation, and a knowledge of how to act in an emergency are needed in these cases. Absolute rest, freedom from worry, confidence in his attendants, easily digested foods, small meals and medicines are all important parts in the treatment of heart cases.

In cases with myocarditis or pericarditis the patients are usually nursed in a recumbent position. In cases with marked dyspnoea they are nursed propped up by back rests with pillows. In cases of orthopnoea the patient should have a board table across the bed, for him to lean on. Oxygen must be close at hand, but not in sight of the patient.

The patient should not be allowed to do anything for himself—he must be spared all exertion of any kind.

Drugs.—These consist of cardiac stimulants, hypnotics and aperients. Patients taking digitalis should be carefully watched and the pulse taken 4-hourly. If the pulse falls to sixty per minute the digitalis should be stopped and the advice of the physician sought. All urine should be measured and tested b.d.

Bowels should be relaxed to avoid straining, and to relieve the heart by taking fluid from the circulation.

T.P.R. should be taken 4-hourly.

GASTRIC ULCER.—Severe cases of gastric ulcer are nursed in a recumbent position. Absolute rest is essential.

Diet.—See Gastric and Duodenal Ulcer.

Drugs.—Morphia (gr. $\frac{1}{2}$ or $\frac{1}{4}$) is ordered when there is bleeding or the pain is severe.

Mouth toilet.—This is very important as in all cases of milk feeding the mouth becomes very furred and dirty if not watched. The cleansing should be done after every feed, and the mouth rinsed out with a cool antiseptic fluid which does not leave a nasty taste.

Vomit and Stools.—These should be saved for inspection. In hæmatemesis the vomit is either dark-red or brown (like coffee grounds) and mixed with mucus and food. The stool may be dark-brown or black according to the amount of digestion the blood has had, and usually is very shiny like tar. The higher up in the intestinal tract the bleeding is, the blacker and shinier the stool will be. If the stool is very red it means that the bleeding has taken place in the last part of the small intestine, in the large intestine or in the rectum.

Severe hæmorrhage.—This may set in at any time, and the symptoms are:

- (1) Pain.
- (2) Restlessness.
- (3) Rapidly increasing pulse rate.
- (4) Cold, clammy skin.
- (5) Subnormal temperature.
- (6) Increasing pallor especially of the mucous membranes of lips and tongue (and of the finger nails).

When any of these symptoms appear the doctor should be informed at once; give nothing by mouth—raise the foot of the bed, apply warmth (either hot bottles or a radiant-heat cradle, etc.), warm stockings on the arms and legs, and extra blankets. At the same time place an icebag, suspended from the cradle, over the abdomen. Give morphia at once and a hæmoplastic preparation if available.

ENTERIC FEVER.—This may be nursed in an open ward with other patients, but must be strictly barrier-nursed—everything

needed for the patient's care being kept by the patient's bedside and separated from all articles used by other patients. It is better to have a tray made to fit on to the end of the bed holding all the utensils, or to have a separate table for these.

Requirements.—Tray, trolley or table.

- (1) Washing bowl.
- (2) Bowl for medicine glass and feeding cup.
- (3) Thermometer in disinfectant lotion.
- (4) Separate pressure-point articles.
- (5) Bowl of disinfectant lotion.
- (6) Towel for the nurse's and doctor's hands.
- (7) Separate enema requirements.
- (8) Doctors' gowns.
- (9) Nurses' gowns.
- (10) A large bowl should be marked with the patient's name and disease, and all bed-linen should be disinfected in this bowl, for at least three hours.
- (11) Another large bowl should be available for the bedpans and urinals of the patient.

Disinfectants.—Carbolic or Phenyle lotion, or chlorinated lime 10% may be used. The stools should be mixed with the disinfectant lotion for three hours, then put down the sluice, and the sluice disinfected, or they may be burnt or buried very deeply as the faeces are a source of infection to other people. Urine should be mixed with the lotion for three hours. Bedpan covers should be disinfected with the same lotions. Bed-clothing and the patient's clothing must also be disinfected in this way before being washed. Epidemics of enteric have occurred when this has not been done.

Diet.—Fluid diet two-hourly—peptonized milk, barley water, orange juice, albumin water, beef tea, chicken soup, strained chicken jelly, fruit jelly, Benger's Food, Ovaltine, Horlicks, tea, cocoa, dhah water.

As the temperature returns to normal, custards, minced chicken, minced fish, bread and butter (*without crust*), bread and milk, or milk, may be ordered. Later this will lead to a full diet. Food must not be changed or increased in amount without the instructions of the physician. Some doctors have a protein treatment, and raw or cooked minced meat may be given.

Complications.—

Third week—haemorrhage, perforation.

Fourth week—haemorrhage, perforation, dry fissured tongue, sores on the lips, delirium, incontinence of urine and faeces, congested lungs, rapid feeble pulse, coma vigil, subsultus tendinum.

Signs of haemorrhage in enteric fever.—Haemorrhage is most common in the third week of the illness—the bleeding point is in one of the Peyer's patches, from the ulcer left by the separation of the slough.

The signs include :

- (1) Gradually increasing pallor and faintness.
- (2) Small, rapid, running pulse, increasing.
- (3) Falling temperature.
- (4) Cold, clammy skin, beads of perspiration on forehead and upper lip.
- (5) Restlessness.
- (6) Sighing or yawning respiration.
- (7) The stools may contain bright blood, or may be dark and shiny and look like tar, from being partially digested.

Signs of Perforation.—In the floor of the ulcer, left by the separation of the slough, a small hole appears and the contents of the intestine gradually leak into the abdominal cavity and set up what is usually fatal peritonitis. Its onset is marked by:

Sudden severe abdominal pains.

Temporary fall of temperature.

Rapid running pulse.

Cold clammy skin.

Quietness—movement causing acute pain.

Rigid abdomen.

Abdomen becomes distended.

There may be vomiting.

A very anxious sunken expression on the face.

A nurse must watch a patient with enteric fever for any of these symptoms. General nursing care in these circumstances:

Inform the doctor at once.

Warmth to body and limbs.

Keep the patient quiet and flat.

Nothing must be given by mouth.

Stop all stimulants.

Have morphia (gr. $\frac{1}{4}$ or gr. $\frac{1}{2}$) ready.

Save all blood clots, tarry stools, etc., for the doctor's inspection.

Quickly prepare the patient for operation if perforation is suspected.

Distension.—Stop milk, and give only whey or albumin water. Apply a turpentine stupe to the abdomen. A turpentine enema may be ordered by the doctor, so prepare it. Oil of peppermint or cinnamon may be given in a little warm water. Hypodermic injections of Pituitrin may be ordered, so have it ready.

A patient suffering from enteric is considered infectious until three negative stools and specimens of urine have been passed.

INFECTIOUS DISEASES—When nursed in private houses patients with an infectious disease should have a room apart, the door guarded by a sheet soaked twice a day in carbolic or Phenyle lotion (1 in 20). Everything needed should be kept in this room or in an adjoining bath-room or verandah.

All articles should be disinfected as for enteric fever. The nurse should wear an overall which is discarded at the door and hung up

just inside. Lysol or Dettol, one drachm to a pint of water, carbolic or Phenyle lotion (1 in 20) should be available for the hands of anyone entering the room.

- | | |
|-------------------|--|
| Soiled Dressings: | These should be burnt at once. |
| Crockery: | This should be hoiled for ten minutes. |
| Cutlery: | These items should be hoiled. |
| Books and Papers: | These should be destroyed or put in the autoclave for ten minutes. |

Room Disinfection.—Enamel ware can be hoiled. Crockery and china ware can also be hoiled. Leather cannot be hoiled, but must be put into Phenyle lotion (1 in 20) for three hours, then washed in soap and water, dried, and then polished. Furniture can be sprayed with a stirrup pump (carbolic or Phenyle lotion 1 in 20) and allowed to dry, and then polished.

The room can be sprayed with carbolic or Phenyle lotion (1 in 20) by means of the stirrup pump. A sulphur candle can be burnt and the room completely sealed for twenty-four hours. A room ten feet by ten feet would require a pound and a half of sulphur.

A formalin lamp may have sixteen tablets of formalin put into the container and the lamp beneath the container lit—the formalin then vaporizes and this disinfects the room.

In both the above methods all windows, doors, cracks, etc., must be sealed with paper so that the room is completely sealed, or the sulphur and formalin vapour will gradually ooze through the cracks in the door or the windows and there will not be enough left to sterilize the room. Also in both these cases the room must be left absolutely closed for twenty-four hours, then the doors and the windows opened until all the vapour or gas has cleared away. After this the walls must be whitewashed or colour-washed as the case may be, and the whole of the room thoroughly cleaned with disinfectant soap and hot water.

The patient before mixing with other people should have a disinfectant bath and his clothes should be changed and completely clean ones put on; the disinfectant bath should have half a drachm of Dettol or the same amount of lysol, to each pint of water. The hair should also be washed in this lotion.

The nurse should wear a clean overall after the patient's bath, and she herself should have a disinfectant bath before mixing with other people. Her clothes, too, should be treated in the same way as those of the patient. *If she neglects these precautions she is a source of infection both to herself and her friends.* She should also have a daily walk.

The servants should be carefully watched and if they touch anything infectious should be treated exactly in the same way as the patient and nurse. In this country servants are often overlooked, and can carry the infection to their own homes and to other people.

Instruments should be put in pure lysol for ten minutes, and then hoiled for twenty minutes.

SURGICAL NURSING

GENERAL PREPARATION OF THE PATIENT FOR OPERATION.—Except in cases of emergency it is advisable to admit the patient one or even two days before operation.

The nurse is responsible for:

The comfort and cleanliness of the patient.

Diet.

Administering drugs at the right time.

Ensuring that the patient sleeps the night before operation, by nursing methods, if possible, or by sedatives.

Carrying out hospital routine and any special treatment.

Obtaining the signature of parent or guardian for permission to operate on children.

Informing relatives of date and time of operation.

USUAL ROUTINE TREATMENT.—Admit the patient to the ward, and take the temperature, pulse and respiration. Give a drink if allowed, put to bed, and test a specimen of urine (reaction, specific gravity, colour, smell, deposit, albumin, sugar). The doctor in charge of the ward must be informed of a new patient's arrival within ten minutes.

Give the patient a bath (blanket or bath-room, according to the doctor's orders). Wash the operation area thoroughly with soap and water and then shave it. Clean teeth, mouth and umbilicus. Report any abnormalities to the sister or doctor.

After the patient is dried and back in bed, swab the operation area thoroughly with 30% Dettol or Zant in water, allow it to dry on the skin, and apply a sterile towel.

Give any aperients or sedatives ordered by the doctor.

MORNING OF OPERATION.—

6.0 a.m. (Three hours before operation.) Give an enema, and douche, if ordered.

7.0 a.m. Cup of tea or clear soup. Glucose may be given up to half an hour before operation.

7.30 a.m. Clean mouth and teeth.

Remove the overnight sterile towel, and paint the area with 2% iodine in spirit; 1% picric acid, 2% mercurochrome or violet-green in spirit may be used instead, if the surgeon prefers them or the patient is sensitive to iodine. It is always wise to inquire on this point. When the spirituous disinfectant has been applied, put on a fresh sterile towel, holding it in forceps and applying a bandage over it.

Dress the patient in a warm open-backed nightgown and woollen stockings. Bind a woman's hair, remove any jewellery for safe keeping, and remove any artificial teeth.

The patient's bladder must be emptied. In many cases the doctor likes the catheter left in position until the operation is finished. Find out the doctor's wishes. Very often an intravenous anaesthetic

is given in the ward, for which everything must be ready. Sedatives may be ordered one hour or half an hour before operation, usually Seconal or Amytal 3-6 grains, hyoscine $\frac{1}{100}$ grain and morphia $\frac{1}{4}$ grain. Atropine may also be ordered (gr. $\frac{1}{100}$ - $\frac{1}{80}$) to dry up the secretions, although hyoscine does this equally well; atropine must never be given in very hot weather.

Cover the ambulance trolley with one or more warm blankets according to season.

The ward nurse accompanies her patient to the theatre, taking with her a clean kidney bowl, a clean towel and the patient's case sheet, chart, etc. The ward nurse must not leave the theatre without the sister's permission.

PREPARATION OF THE OPERATION THEATRE.—Everything must be ready before the patient arrives. The operation table must be clean and covered with clean sheets.

The Anaesthetic Trolley.—

The contents include: bottles of ether, chloroform, C.E. mixture (chloroform 2, ether 3), an ampoule of ethyl chloride, and any other anaesthetic the anaesthetist fancies.

Vaseline, castor oil.

Two face masks.

Gamgee tissue and cotton-wool, scissors.

Two clean towels.

Hypodermic tray, containing hypodermic syringe in spirit, iodine, swab-sticks and ampoules of byoscine, morphia, atropine, Pituitrin, adrenaline, Coramine, nikethamide and lobeline.

Tongue forceps, mouth gag, two airways with tapes attached, swabs and swab-holding forceps, files for opening ampoules.

Kidney tray.

Rubber tubing, catheters, glass connexions and sticking plaster for oxygen and CO₂ cylinders.

Oxygen and CO₂.—Cylinders must be tested each morning before operations begin, and a spare cylinder of each kept in a convenient place. Spanners for opening them must be kept with them.

Drums.—These contain: gowns, towels, sheets, masks, cotton-wool, dressings, gauze dressings, pillow covers, tray covers, bandages, swabs, tetra towels, swab-sticks, tampons, ribbon gauze, abdominal towels. All are sterilized in the same way—line the drum with a clean towel, or a lining of old linen or lint, and mark the contents of the drum on the outside of the lid and then place in the sterilizer.

METHOD OF USING STERILIZER.—

- (a) Fill the outer chamber with water.
- (b) Light the gas or stove.
- (c) Watch the heat gauge—when this registers 252° F. the drums, etc., may be placed in the sterilizer.
- (d) Put in the drums.
- (e) Close the door.

- (f) Leave the drums in the hot-air jacket until the pressure gauge registers fifteen (15) pounds of pressure per square inch—leave in the hot-air jacket for a further ten minutes.
- (g) When the pressure shows fifteen pounds turn the hot air off and turn on the steam tap. Leave the drums in steam for half an hour.
- (h) After half an hour, turn off the steam tap and turn on the hot-air tap. Leave the drums in the hot air for another half an hour to dry the dressings. (Wet dressings show that the second period in the hot-air jacket has not been long enough.)
- (i) After half an hour turn off all taps, and open the little tap in front of the sterilizer to let out the steam from the inside of the sterilizer—leave open for ten minutes to dry the dressings further.
- (j) When all the steam has left the sterilizer you will be able to open the door, take out the drums, close them quickly, and place them in the right position for the ward nurses to come and collect them. Have some method of signing (from the ward) to ensure that each ward receives its own sterilized articles.

Some surgeons like the packet method. Everything that the surgeon may need for the operation is in the packet. The articles that he needs first are placed at the top—those he needs last at the bottom. For example:

- (1) Operation sheet, as this goes on last.
- (2) Four operation towels—these go on before the sheet.
- (3) Swabs—these have to be counted again.
- (4) Cotton-wool swab-sticks.
- (5) Gown, cap, mask.

The Glove Drum.—Line the drum with old linen or with lint. Turn the cuffs of the gloves back two inches and put them in pairs. Make small squares of lint the size of the drum—then:

- (1) A pair of gloves.
- (2) A small towel or square of lint.
- (3) A small bag of French chalk to dust inside the gloves.

(The towel or the lint may be used to dry the hands on, if necessary.)

The drum is then put into the sterilizer, the hot air is turned on and the gloves are *dry sterilized* for twenty minutes. No steam is used as the gloves cannot be saturated, and the continued wet heat stretches the gloves and also makes them soft.

INSTRUMENTS.—Put one teaspoonful of sodium bicarbonate into each pint of water in the instrument sterilizer. This raises the boiling point of water, and also prevents rust forming on the instruments.

Do not put sodium bicarbonate into water in which rubber or thread is to be boiled; it rots them.

Boil the instruments for twenty minutes, unless under the direct order of a doctor who wants an instrument urgently—then boil for two minutes and inform the doctor that they have only been boiled for this shorter period. The instruments are then lifted out of the sterilizer by special lifters with wooden handles (the whole tray being lifted out) and laid on the sterile table ready for the theatre sister. Cover with sterile towels until needed for the operation.

To clean instruments.—First scrub them, especially the joints, with warm soapy water. Then put the instruments to soak in water; boil them in lysol solution (1 in 160, i.e., 1 drachm of lysol to 1 pint of water) for ten minutes. Dry them with a clean towel, paying special attention to the joints. Then put them in an instrument cupboard, and where it is very damp put small gallipots of calcium chloride into the cupboard to absorb the moisture.

Sharp instruments.—It is better not to boil cutting instruments as it dulls the cutting edge, but when it is a matter of urgency wrap the sharp instrument in old linen or a piece of lint, fasten it with a safety pin and boil for two minutes. It is quicker and better for the cutting edge to put the instrument into pure Dettol or lysol for five minutes. When the instrument is sterilized by the pure lysol method, put a layer of old linen or lint at the bottom of the dish in which the article is sterilized and, after the five minutes' sterilization has been completed, take out the instrument with sterile forceps and place in sterile water to wash off the lysol. If the lysol is not washed off there is the danger of burning the skin of the patient.

Cutting instruments may also be sterilized by being left in 75% rectified spirit or 1% Cetavlon in water for half an hour before being used. They may also be left in the spirit until needed, but before being used they should be washed in sterile water.

Cutting instruments include: scissors, scalpels, Bard-Parker blades, needles, safety pins, and saws.

In all cases be sure that the medium of sterilization has been washed off, leaving the instrument free from danger for the patient.

HYPODERMIC SYRINGES.—If not kept in spirit or Dettol these are sterilized as follows: Take the syringe to pieces, put it in warm or cold water, bring to the boil and boil for from two to five minutes. Do not attempt to replace the plunger of a Record syringe while it is hot.

CATHETERS.—

Metal: as above for instruments.

Rubber: boil in plain water.

Gum-Elastic: put in 1: 1,000 solution of perchloride of mercury, 1: 20 carbolic or 5% Dettol for ten minutes, then rinse with sterile water.

In the formalin method, the catheters are put in a tall glass jar with a gas-tight cover and sterilized for 24 hours in formalin vapour; six formalin tablets are used.

ENAMEL WARE.—These articles can be boiled in large containers

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ENAMEL WARE.—These articles can be boiled in large containers

or, in cases of urgency, flamed with methylated spirit. Water must not be poured in until the bowl is cool.

LIGATURES AND SUTURES.—Silk, linen, horse-hair, nylon and silkworm gut should be boiled for half an hour before use. If stored these ligatures are kept in spirit. Carbolic acid ruins nylon.

Catgut is sterilized as follows:

Make the following solution:

R. Iodine	..	..	..	..	gr. 5
Potassium Iodide	..	..	..	..	gr. 10
Potassium Iodate	..	..	..	..	gr. 1½
Glycerin	..	..	..	..	℥ 40
Distilled water ad	..	..	..	..	3j

Keep catgut in this solution for ten days, then transfer it to spirit for two days. Put in fresh spirit for another two days, then transfer to dry sterile envelopes or keep in sterile lint. Catgut thus prepared can be kept indefinitely. Before use samples from each hatch must be tested bacteriologically.

Heat sterilization is carried out in toluol or xylol at a temperature of 160° F. for four hours.

Raw catgut is chromicized by being put for 24 hours or longer in a half per cent solution of chromic acid in Liquor. Hydrarg. Perchlor. 1:500, to which sufficient sulphurous acid has been added to produce a greenish colour. This does not sterilize catgut, it only toughens it. The catgut is then sterilized as above.

To remove iodine from catgut, soak in a sterile 1% solution of sodium thiosulphate (hypo). This must be sterilized in an autoclave for four hours beforehand because for some reason the thiosulphate ion appears to cause a high survival rate of bacteria (Davis).

Ampoules of catgut are kept in an antiseptic solution such as carbolic acid or spirit.

OIL AND VASELINE.—It is not sufficient to place the vessel containing either of these substances in some boiling water and to leave it for ten minutes; they should be heated to their own boiling point in a metal container, allowed to cool somewhat, and then poured into a sterile bottle or pot, which must be dry.

Storage of Instruments.—Before being put away all instruments must be clean, dry, and free from finger-prints; jointed instruments such as forceps and scissors must have the joint cleaned and dried; blood rusts steel more quickly than anything else. The best way to dry an instrument is to dip it in hot water and then dry it with a clean dry towel. The clean instrument, held in a towel, is now lightly smeared all over with Vaseline.

Indiarubber.—This should be kept as cool as possible, preferably in a Frigidaire in the hot weather. At least once a week the rubber articles should be stretched, twisted and bent; this prevents the rubber from becoming hard, and is the most important point in keeping rubber in good condition. When kept in a tin or cupboard in which the atmosphere is impregnated with kerosene vapour indiarubber keeps both softer and longer; a convenient method is

to have a tray of kerosene oil at the bottom of the receptacle. Another method is to keep the rubber well powdered. Whenever possible, Tropical Rubber should be ordered.

Gum-Elastic articles should be kept cool and well powdered.

SKIN STERILIZATION.—The application of 2% iodine in spirit to a dry skin remains the best method of sterilizing the skin. Spirit in a strength of 75% is increasingly used, but careful tests have shown it to be unreliable, especially on a greasy skin. The action of mercurochrome appears to be relatively weak, but Dettol 30% in water is effective if applied half an hour before operation and allowed to dry on the skin.

Sterilizing the Hands is a difficult procedure; the finger nails must be kept short and clean, but although prolonged scrubbing with soap and water removes dirt and the organisms associated with it, it cannot remove the staphylococci and diphtheroid bacilli which normally inhabit the skin. These may even be brought to the surface as the skin gets sodden. This, however, can be largely counteracted if, after the hands have been scrubbed, they are washed in 30% Dettol for three minutes and then dried on a sterile towel.

The habit of not drying the hands after "washing up" before doing a dressing or minor operation is most dangerous. If a sterile towel is not available, dry the hands on an ordinary clean towel or on some gauze or lint, but do not let them drip infected water into a clean wound.

A smooth surface like a tiled wall is easier to keep clean than a rough one such as sandstone; in just the same way, a smooth skin is easier to keep clean than a rough one. Any antiseptic, therefore, such as mercury, lysol or carbolic acid, which irritates the skin, cannot be too strongly condemned and the practice of some surgeons of immersing the hands and arms in a lysol solution before operation does more harm than good. Dettol, if it does not irritate the skin, is not open to this objection, but even so, its repeated application causes roughness and soreness, some people being much more sensitive than others. For operations, it is far more important for the surgeon's gloves to be free from punctures and for him to be sufficiently dexterous to avoid pricking his gloves with needles or knife points.

For quick sterilization of the hands apply pure Dettol, rub in for one minute, wash off with spirit or sterile water and then dry; or wash with Cetavlon powder and water.

When doing large numbers of operations and consequently washing up many times a day, the writer finds Pears' soap by far the best for keeping the skin of his hands in a smooth condition, which is greatly helped by rubbing in Nivea cream after the last operation. Antiseptic soaps contain enough antiseptic to irritate the skin but not to sterilize it.

Nail Brushes.—The soggy mass, religiously kept in antiseptic, so often found in hospitals, is perfectly useless for cleansing the hands.

Nail brushes should be sterilized once daily, kept dry and be of the best quality, with close-set bristles. The "Prophylactic Hand Brush" is the best kind the writer has so far discovered and it survives several years' hard use.

Needless to say, after being used for removing frankly septic material from the hands, the brush must be sterilized immediately.

Chlorophenols.—Dettol, Zant, etc., contain one of these substances, such as chloroxylenol dissolved in a solution of aromatic oils and soap. They have the advantage of being non-irritating and have a pleasant smell.

Cetavlon is cetyl trimethylammonium bromide. It is a neutral, non-irritating powder and is used in 1% solution.

TO PREPARE A ROOM IN A PRIVATE HOUSE FOR OPERATION.—

Remove all extraneous articles such as carpets, purdabs, pictures, mirrors and non-essential furniture.

Have the floor scrubbed with Phenyle and spray the walls and ceiling with Phenyle by means of a Flit-gun.

Provide a table which is long and narrow, but it is better to bring a portable operation table. Certain operations can be performed with the patient in his own bed.

Provide four small well-scrubbed plain tables, one for the anaesthetist, one for the surgeon, one for the sister and one for bowls of lotion.

See that the lighting is adequate or obtain at least two good flash lights.

Make certain that wind cannot blow dust into the room.

Make proper arrangements for washing up; nail brushes, soap, hot water, basins or running water are required.

Other arrangements should approximate as nearly as possible to those described above for an operation theatre.

The room should be ready at least one hour before the operation in order to allow any dust to settle.

POST-OPERATIVE CARE.—

PREPARATION TO RECEIVE PATIENT AFTER OPERATION

THE BED.—This is screened, if in a ward, and made up with a mackintosh and draw-sheet, an extra one for tonsillectomy and head cases. The bed will be warmed by hot-water bottles, which should be removed when patient is put in. Fold top clothes so that they can easily be removed when the patient comes back.

HAVE READY.—Extra warmed blankets. Basin and towel for vomit. Tongue forceps and gag. Sponges for the mouth, a sponge holder and a mouth-wash. Sterilized hypodermic syringe.

In severe operations and when the patient is likely to be collapsed, prepare and sterilize infusion apparatus, saline and glucose. Blocks for the bed. Cradles, splints, and sandbags when necessary.

For patients to be placed in a Fowler position later, extra pillows, a long knee pillow, and an air cushion will be required.

The patient is taken back to the ward on a stretcher carried on a trolley, and put into a previously warmed bed; again note that hot-water bottles must not be in the bed of an unconscious patient. The patient is either lifted from the stretcher to the bed or placed on the bed with the stretcher underneath. The poles are then withdrawn, the patient rolled over to one side while the stretcher with blankets is rolled underneath him; he is then turned to the other side and the stretcher blankets withdrawn.

The patient should lie with the head on one side and a small mackintosh under the head, to allow mucus to leave the mouth and to prevent the tongue from falling back. If the patient lies on his back vomit may be inhaled and cause pneumonia.

PULSE.—The pulse should be counted hourly and any change reported to the doctor on duty. A rapid pulse may be only shock, but a rapidly increasing pulse may mean haemorrhage.

COLOUR.—Watch the colour of the patient—the throat may become blocked with mucus and the face turn a blue colour. See that there is always an airway, and if the patient becomes cyanosed (blue) send for a doctor. Cleanse the patient's mouth, slip the arm under the pillow and support him a little—get help and have the oxygen and CO₂ brought to the bedside.

RESTLESSNESS.—This may be due to pain, bleeding or shock. Inform the doctor who may order sedatives or drugs according to the patient's condition.

SLEEPLESSNESS.—This may be relieved by a warm drink, a little massage of the forehead, a warm bottle, a lowered chick or purdah, a quiet room, catheterization (if this is necessary), reading aloud to the patient (if in a private house), a warm blanket bath, a little fresh air if the room is too hot, or if these fail ask the doctor to see the patient and prescribe some sedative for him.

DRESSINGS.—A clean dressing is not removed until the stitches are taken out. If there is any oozing of blood through the dressing it is covered with another sterile dressing and bandage and watched carefully for further bleeding. A septic-wound dressing may have to be renewed every four hours, but usually on the first day the clean dressing is only packed over the soiled one, so that the patient is not unduly disturbed. When there is a drainage tube the dressing may have to be renewed very often. When the dressings are touched all aseptic precautions must be taken.

URINE.—This may not be passed in the hot weather before twelve hours or even longer, but if there is distension of the bladder and the patient cannot pass urine naturally, he should be catheterized.

DIET.—Cases without vomiting or complications are put on a fluid diet after twelve hours, and a light diet after the first natural bowel action. After this a full diet may be given if no ill-effects are observed.

After a gastro-intestinal operation special diet instructions are given by the surgeon.

APERIENT.—Generally, castor oil may be ordered 48–72 hours after operation. After rectal operations a bowel action must not be encouraged until the wound has had time to heal; an aperient may not be given until the fifth or sixth day.

MISCELLANEOUS POINTS.—

Sleep and quiet are of the greatest importance.

Lifting of the patient must be done by two nurses to avoid strain.

Blanket baths must be given daily, and the face and hands sponged and the mouth and teeth cleaned h.d.

The back and the pressure points must be massaged four-hourly or more often if the patient is incontinent.

The bedpan must also be given four-hourly—it encourages the patient to pass urine. Catheterization is only performed as a last resort.

Temperature, pulse and respiration should be recorded every four hours for the first three days, and more often if there are complications.

Sutures are usually removed between the eighth and tenth day.

There is a modern tendency to get patients out of bed on the second or third day.

COMPLICATIONS.—

Vomiting.—If the patient retches a good deal, vomits in small quantities light-green coloured matter and there is no abdominal distension, tenderness, fever or a quickened pulse, give sodium bicarbonate (1 drachm to 1 pint of tepid water). This will act as an emetic. Support the wound when the patient vomits. Persistent vomiting must be reported to the doctor immediately.

Gastric Distension.—This may be relieved by a dose of Mist. Carminativa (1 oz.) or essence of peppermint (4 minims in 2 oz. of water). Marked distension must be reported to the doctor immediately as he may wish to pass a stomach tube.

Intestinal Distension.—This may be relieved by passing a flatus tube. If there is marked pain and distension the doctor must be informed at once. He may order a turpentine enema, a turpentine stupe, a bile enema, Pituitrin (1 c.c. hypodermically) or Pitressin.

Shock.—The signs are: irregular pulse, rapid pulse, subnormal temperature or cold clammy skin. Keep the patient still, warm and quiet, and raise the foot of the bed. Inform the doctor, who may order stimulants or give a transfusion.

Haemorrhage.—Signs: restlessness, air-bunger, soft rapidly increasing pulse becoming more difficult to find. Send for the doctor at once and prepare apparatus for blood transfusion. Raise the foot of the bed.

OBSTETRICAL NURSING

The nurse must keep her person, hands, nails, clothes and teeth scrupulously clean.

ADVICE TO AND EXAMINATION OF PATIENTS.—The patient should be seen soon after she thinks she is pregnant and, if a primigravida, given advice about diet, hygiene and exercise; she should also be advised about the room and requirements if the baby is to be born at her home. A list of baby clothes should also be given; these should be ready by the seventh month.

The patient's abdomen should be examined by inspection, palpation and auscultation, the urine should be tested for albumin and the patient instructed to bring a specimen when she comes for examination, once a month for the first six months and twice a month for the last three months.

REQUIREMENTS FOR THE BABY.—

- 3 doz. napkins (squares of double mull-mull).
- 1 or 2 doz. Turkish towelling napkins to put under the baby, also a small square of mackintosh.
- 4 nightgowns, opening all down the back, cotton for hot weather and viyella or nun's-veiling for cold weather.
- 4 vests, cellular cotton for hot weather, silk and wool for cold weather.
- 3 binders (2½-inch crêpe bandage; only needed for first 10 days).
- 2 shawls, woven not knitted. (Kashmir are the best.)
- 4 pairs of booties.
- 4 short knitted jackets for cold weather.

Bath.—The best is enamel with its own stand, fashag this a small zinc tub to stand on a low table.

Cot.—A wicker or canvas cot with its own detachable stand. It should be lined if made of wicker and always covered with a mosquito net, preferably dyed to lessen glare. A Moses basket or Karrisot is useful for travelling.

The mattress should not be too soft, and should have a washable cover. A mackintosh slightly larger than the cot is put over the mattress, then a sheet tucked in and a Turkish towelling napkin, folded, is put where the baby is to lie. Most people nowadays do not give the baby a pillow, but this is optional; if a pillow is used it must be hair or cotton, never feather.

This cot should last for six months, when the baby will need a larger one with sides.

LABOUR-ROOM PREPARATION.—

This should resemble an operation theatre as nearly as possible.

- (a) Remove all extraneous articles such as durries, curtains, pictures, etc.

- (b) Prepare the bed as follows:

Take a single bed with a firm mattress, cover with waterproof sheet and then with a clean cotton sheet. Tie two strong bandages to the foot of the bed for the patient to pull on. Provide pillows, and blankets if it is cold.

(c) TABLE I (covered with a sterile towel):

A flamed basin containing warm, dilute Dettol with plenty of cotton-wool swabs in it.

Swabs in boric lotion for baby's eyes.

Eye drops and dropper.

Instruments:

Two artery forceps.

Scissors, cord ligatures.

Suture needles and silkworm gut.

Catheter.

Mucus catheter.

Bottle of sterile liquid paraffin.

Doctors' instruments if required.

(d) TABLE II:

Gowns, gloves, towels, dressings, pads.

(e) TABLE III:

Anæsthetic, hypodermic syringe, ampoules of Pituitrin, ergot, Coramine, lobeline.

(f) Cylinders of oxygen and CO₂.

(g) Plenty of hot water, at least three sterile bowls, and a bucket.

Instruments, dressings, gloves, etc., must be sterilized as for an operation (see under Surgical Nursing).

If, but only if, an instrument is required in a great hurry it may be swabbed with pure Dettol or lysol, and then washed with spirit or sterile water.

Everyone in the room must wear a mask.

NORMAL LABOUR.—

FIRST STAGE.—This is from the commencement of true pains to the full dilation of the os.

Primipara: 12–18 hours.

Multipara: 6–8 hours.

Palpate, auscultate, inspect, count the foetal heart sounds. Give the patient an enema and a warm bath, and shave. Allow her to walk about. Give light diet; tea with sugar is a great favourite.

SECOND STAGE.—This is from the full dilatation of the os, to the complete expulsion of the child.

In a Primipara: 2–4 hours.

In a Multipara: 1–2 hours, or may be rapid.

Put sterile leggings on the patient, sterilize the vulva and the thighs. Empty the patient's bladder if necessary.

Wash up, and put on gloves and gown.

When the head is seen at the vulva, control the advance of it by flexion:

- (a) Left hand, the fingers on forehead, and palm of the hand at the back of the head, helped by right hand on perineum.

- (b) When extension takes place, slip the perineum over the baby's face when there is *no* pain.
- (c) When extension fully occurs the head is delivered.

As the head is born, feel for a loop of the cord and pull it down away from any pressure.

Do not hurry delivery.

Assist rotation of the shoulders, allowing the presenting one to slip out first. If it is the posterior one, lift the head up over the mother's pubes, *in the line of the pelvic axis*, to *reduce pressure on the perineum*.

Swab the eyes, one at a time, and put in drops.

Clear the throat and nose of mucus.

Hold the baby by legs with head extended to help expel mucus.

Wait for the cord to stop pulsating and then apply two ligatures—one 2 inches from the baby, and the other 1 inch nearer the mother.

Cut the cord between the ligatures, squeeze the blood out, apply a dressing and sufficient bandage to keep the dressing in place.

Wrap the baby in a sterile towel, put over a *warm* hot-water bottle (*not hot*) with the head slightly down and on one side to allow mucus to escape.

For the conduct of third stage and for complications of labour, see *Obstetrics*.

ROUTINE FOR NEWLY-BORN BABY.—

- (a) Prepare the bath.
- (b) Weigh the baby and record the weight before the bath.
- (c) Swab eyes, nose and throat with horic swabs, and put in eye drops if not already done.
- (d) Oil thoroughly and dry, removing vernix.
- (e) Warm bath.
- (f) Observe passing of urine or meconium and examine thoroughly for deformities, especially mouth, anus, foreskin and feet.

The Cord.—After the bath paint the base of the cord with methylated spirit and apply powder or Cibazol, and a dressing with a "keyhole" cut in the middle; wrap the cord in it, with the cut end upwards, and sew on the binder.

After the first day do not immerse the cord at bathtime, but keep it dry.

The cord usually falls off in dry weather in about 4 or 5 days, but in wet weather it may be delayed until the 10th or 12th day. If the base of the cord is wet or red and the cord itself soft or wet, the doctor must be informed at once.

ROUTINE AFTER NORMAL DELIVERY.—For the first three days T.P.R. is taken 4-hourly, lochia and urine noted, and charted.

Swabbing of vulva 4-hourly, sterile diaper re-applied.

Diet: light until the patient has a normal bowel action. Some

doctors give castor oil (1 oz.) on the evening of the second day, and an enema the following morning.

After-pains.—Apply an abdominal and hip binder, and a hot-water bottle to the abdomen. Put the patient in Fowler's position and massage the uterus to allow free drainage of lochia and clots. Injections of Lutocyclin or similar preparation may be ordered, and aspirin given.

A glass of fluid should be given half an hour before each feed.

BABY'S FEEDS (*see also* Infant Feeding).—These are given 6-hourly the first day, to start as soon after delivery as suits the mother, and afterwards, 6 a.m., 12 noon, 6 p.m. and 10 p.m. but for not more than two or three minutes each side until the milk begins to come in, or cracked nipples may result.

The second day, the feeds should be 4-hourly.

At birth the baby's stomach holds 1 oz., and during the first three days of its life a baby does not take full feeds. The meconium in the intestines has in it a certain amount of food that is absorbed. Never give a new baby castor oil, as it clears out the meconium too soon.

Most babies lose weight during their first week, but by the end of ten days should have passed the birth weight and started to gain in weight.

THE BREASTS.—Support, s.o.s., bathe before and after feeds. Wash the nipples with boric lotion and sponge with weak spirit after feeding. If breasts become engorged, cut down the amount of fluid taken by the mother.

PERINEAL SUTURES.—If there are perineal sutures, after swabbing the vulva, dust with a sulphur powder and apply a sterile dressing, pad and bandage. The main treatment is to keep the wound dry and sterile. A bowel action may not be allowed for 4 or 5 days. Then the patient may have 1 oz. liquid paraffin on the 4th or 5th day. The sutures may be removed with all aseptic precautions on the 8th–10th day, according to the condition of perineum.

The puerperium is the six weeks following delivery while the uterus involutes to its normal size.

Any high temperature, rigors, rapid pulse, delirium, or foul-smelling lochia must be treated as being suspicious, and the patient must be barrier nursed until seen by the doctor. The nurse attending this patient may not nurse anyone else at the same time.

WHITE LEG (*Phlegmasia alba dolens*).—This complication sometimes comes on about 10 days after delivery. The leg is large, white, painful, pits on pressure and cannot be raised from the bed.

PREVENTION.—White leg can be prevented if the patient is encouraged to move about in bed from the day of delivery; she should not be given a knee pillow, as the stillness and the pillow may slow down the circulation and cause the blood to clot.

TREATMENT.—The patient must be kept absolutely still, to prevent the dislodgment into the circulation of the blood clot.

Put a firm pillow under the affected leg, with the foot supported by a sand-bag, or a sling on the bed cradle.

Wrap the limb in glycerin and Ichthyol and cotton-wool, with a manytail bandage, and a cradle over the limb.

Take T.P.R. 4-hourly for the first two or three days, then b.d.

Keep the patient in bed for 3 weeks, give her some occupational therapy that she can do without sitting up. There is no indication to stop breast-feeding, except under doctor's instructions.

Whilst oedema persists the patient should be kept on light diet but when pain and swelling have subsided, put the patient on full diet and encourage her to do gentle leg movement, beginning by hanging the leg over the side of the bed for one minute. She must begin to walk very slowly.

OPHTHALMIA NEONATORUM.—*See Obstetrics and Eye.*

PREMATURE INFANTS (*see also* Infant Feeding).—Any baby under 5 lb. must be treated as a premature infant. They are feeble in every way as their organs are not ready to carry on the functions of maintaining heat, breathing, and digesting. Therefore the three great essentials are:

- (1) To keep its body temperature at a normal level between 98° and 99° F.
- (2) To handle the infant as little as possible.
- (3) Careful feeding.

Prepare a suitable cot, hot bottles, and a room at a temperature of 70° F. Incubators are not necessary. Line a basket cot with thick flannel or brown paper. Lay a large blanket 70 inches by 44 inches allowing more on one side than the other and 12 inches at the bottom. On this put a hair or wool mattress, then a chaff mattress previously baked, then batiste, a blanket to cover, and a pillow. Three hot-water bottles are used; place one at the foot of the cot under the chaff mattress, temperature 180° F. The other two are placed on either side between the enveloping blanket and the mattress at a temperature of 160° F. These need changing—for a very feeble child—hourly. A Thermega pad is better still.

Wrap the child up well in a shawl, cover the head, lay on one side, cover with a light shawl or blanket and then fold over enveloping blanket, and pin—then fold up bottom of blanket over the feet and fasten. The child must not be removed from the cot for at least 6 hours or 12 hours if very feeble, as it must be allowed to get over the shock of birth. Watch the colour, and make sure the cord does not bleed. Take the temperature 3-hourly, twice in the rectum, and keep it between 98° and 99° F. by means of heat in the cot. Change the child to the other side before feeds.

To dress, get everything ready by a warm fire—clean the eyes and nose—wipe over with warm olive oil, expose as little as possible, and dress in a gamgee jacket and flannel petticoat, woollen cap and hoots, reaching up above the knees, and a warm shawl. A Harrington square napkin is used.

Babies under $3\frac{1}{2}$ lb. should only be oiled and undressed every 3rd day, between $3\frac{1}{2}$ and $4\frac{1}{2}$ lb. every other day and over $4\frac{1}{2}$ lb. every day.

Babies reaching 5 lb. must *gradually* begin to be treated as normal.

Opinion is varied as to how soon a premature baby is fed, but it must be allowed to get over the shock of birth for at least 6 hours and a little boiled water given. If the baby is under 3 lb. it should be fed $2\frac{1}{2}$ -hourly, and 3-hourly at night—nine feeds in 24 hours and between 3 and 6 lb., 3-hourly day and night—eight feeds in 24 hours.

Breast feeding is essential, and until milk is secreted the milk of a nursing mother is substituted, if available. This must be drawn off with all attention to cleanliness. It is safer to boil it and dilute with boiled water (equal parts). The amount required depends upon the weight of the child.

A child will require $\frac{1}{6}$ its body weight in fluid daily.

For example, for a 3-lb. child: 48 ounces \div 6 = 8 ounces required, divided equally into the number of feeds, usually 8, = 1 ounce for each feed.

The baby should be fed by a bottle, or a pipette if too weak to suck, and not taken out of the cot. As the weight increases to over $3\frac{1}{2}$ lb. the baby can go to the breast for one feed a day, gradually increasing to two and so on.

To keep up the supply of milk without the baby's sucking:

The milk must be expressed regularly every three hours, beginning on the 2nd day. A little massage given twice a day stroking from without towards the nipple. If the milk does not come by the 3rd day, try hot and cold compresses alternately for 10 minutes before massaging. Do not cover the nipple. Regular expression, external stimulation and plenty of water to drink will keep up a good supply of milk until the child can suck.

A daily injection of 500 units of oestrogen and the administration of a quarter of a grain of Thyroideum Siccum daily to these babies is a great help in keeping them alive.

COMMON DISINFECTANT LOTIONS AND SOLUTIONS USED IN MIDWIFERY

- (1) **LYSOL**: 1 drachm to 1 pint sterile water: for hands or brushes.
 $\frac{1}{2}$ Pure "Lysol"—Used to sterilize quickly instruments, needles, etc. : for swabbing or douches.
- (2) **DETTOL**: 1 drachm to 1 pint sterile water: for hands or brushes.
 $\frac{1}{2}$ Dettol Cream for P.V. examination. : for swabbing or douches.
- (3) **PHENYLE**: 1 oz. to 1 pint of water: for drains, clothing, rooms, beds, bedpans, sheets, etc.
 The same strength made with hot water is an efficient deodorant.
- (4) **CARBOLIC ACID**: 1 oz. of pure carbolic acid to 1 pint of hot water (1 in 20) is used, as for Phenyle of the same strength.
- (5) **CETAVLON**: 1% in water: for sterilizing hands, instruments and skin.

- (6) **IODINE 2% OF VIOLET-GREEN 2%**—Used to paint the skin to make it aseptic.
IODINE, 1 drachm to 1 pint of water—Used for douches and surgical baths.
IODINE OR VIOLET-GREEN—Used to sterilize the perineum, in suture of the perineum.
- (7) **SPIRIT**—Used to sterilize glass syringes, etc. The glass article must remain for half an hour in the spirit before use. May also be used to sterilize and keep dry the sutures in perineorrhaphy. Also used at the base of the baby's cord to keep it dry and sterile.
- (8) **CONDY'S FLUID**, 1 grain of potassium permanganate to 1 pint of sterile water: for washing septic wounds, for douches and for mouth washes.
- (9) **BINODIDE OF MERCURY**, 1 tablet to 1 pint of sterile water is 1 in 1,000—
 Used for hands, brushes, cord ligatures
 1 in 4,000 used for douches.
 1 in 10,000 used for irrigating eyes.
- (10) **PROTARGOL 5%**
ARGYROL 10%
SILVER NITRATE 1%
COLLOSOL ARGENTUM
 or **PENICILLIN**, 2,500 units per c c } Eye drops for baby
- (11) **BORIC LOTION**: for eyes, breasts, storage of catheters, etc.

OBESITY

Obesity is generally divided into (1) endogenous, which includes that due to heredity and endocrine disorders; and (2) exogenous, due to over-feeding or lack of exercise. In the former the basal metabolic rate is low, and in the latter it is normal; the logical treatment, therefore, would seem to be to increase the metabolic rate in the endogenous cases, to cut down the food and increase exercise in the exogenous, and to do all three in the mixed types. These methods are, in fact, the basis of most systems of treatment, but they do not always work out as well in practice as they do in theory.

There is also a strong hereditary factor.

We all tend to put on weight as we grow older, partly because our circumstances improve, partly because we take less exercise, and partly because of our glands, but there are certain sex gland crises such as puberty, child-bearing, the menopause and the "male climacteric" when a rapid increase of weight is likely to occur.

TREATMENT.—

Diet.—Find out *exactly* what the patient is eating (these patients often give *wrong information*; for instance, a patient of the writer's who weighed 17 stone said that his appetite was very poor. Happening to sit next to him at a dinner party that evening, the writer observed with regret that when the lobsters were passed round, the patient took three, leaving none for the writer or his neighbour on the other side). If it is possible to find out and weigh the different components of the patient's diet, it is well worth the trouble as it gives a logical basis for treatment, which could be further consolidated by repeated observations of the basal metabolic rate, but these counsels of perfection cannot always be carried out.

Reference to the article on Diabetes Mellitus will show the number of calories being consumed. The basal diet for an ordinary adult is about 1,500 calories in 24 hours, so if the patient is consuming more than this, cut down the diet to less than 1,500 calories to begin with. Certain principles in cutting down diet should be observed so as to make the process both more effective and less unpleasant.

- (a) Drastically reduce all fats and all carbohydrates such as flour, rice, sweets, chocolates, potatoes and sugar. Saccharine may be given if the patient is very fond of sweet things. Forbid snacks between meals.
- (b) Make up bulk by giving foods composed largely of cellulose and with a low calorie value, such as fresh fruits, green vegetables, carrots, onions and turnips, which have only a fraction of the calorie value of fat; for instance, a cucumber contains 80 calories per pound, compared with 3,600 calories in a pound of ghee.
- (c) Restrict the fluid intake, especially at meal times; give skimmed milk instead of full-cream milk, and make the patient drink water between meals instead of syrups and fruit squashes.
- (d) *Smoking*.—The heavy smoker tends to be thin because his—or her—appetite and digestion are both poor, and a cigarette before a meal temporarily reduces the appetite, but whether it is to be recommended on other grounds is open to doubt. Opium has the same effect and even greater drawbacks.

Exercise.—This is the physiological way of raising the metabolic rate, so all obese people should be encouraged as part of the treatment to take reasonable exercise, but it must be remembered that in these cases the heart, like the rest of the body, is flabby and, further, that it has extra work to do, so exercise must be graduated and gentle, not sudden and violent: a walk round Summer Hill is better than a game of squash.

Hormones and Drugs.—The pituitary gland probably controls fatness to an enormous extent, partly through other glands, so if a condition such as dystrophia adiposo-genitalis or obvious menopausal obesity occurs, much can be done by giving gland-stimulating extracts of the anterior pituitary, or by giving androgens or oestrogens.

Thyroid extract certainly raises the metabolic rate, but unfortunately, in doses sufficient to cause marked loss of weight, it also raises the pulse rate to an uncomfortable or even dangerous degree. It is, however, the mainstay of the "obesity specialist": it should be given originally in doses of $\frac{1}{2}$ grain of Thyroideum Siccum three times a day before meals, the dose being raised by about $\frac{1}{4}$ grain every four days until the pulse reaches 90 or palpitation or discomfort is felt, when it should be cut down to the last dose but one; the patient should be seen at regular intervals.

The gland-stimulating influence of the pituitary already mentioned extends to the thyroid, *Thyrogan* (B.D.H.) being the substance found in the pituitary which stimulates the thyroid; the recommended dose is 50 guinea-pig units (one ampoule) intramuscularly two or three times a week. It is an advantage to combine the injection with one of the appropriate sex hormones such as an oestrogen, Gonan or an androgen.

Other Drugs.—Certain laxatives are advertised as being "slimming", the idea being, presumably, that if a patient has perpetual diarrhoea she will never put on fat, and an enterprising foreigner is alleged to have sold tablets containing tapeworm eggs, until the practice was stopped by law.

To sum up.—Dieting, exercise and hormones are the three main lines of treatment, but the essential factor for success is careful attention to detail and insistence on thorough obedience to instructions; otherwise, in the words of Ogden Nash:

"Though human flesh can be controlled,
We're told by this and that
You cannot win,
The thin stay thin,
The fat continue fat".

OBSTETRICS

ANTE-NATAL WORK

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ANTE-NATAL WORK.—This has as its object the safe delivery of a healthy child, from which it follows that particular care is taken of a primigravida, and in a multipara careful enquiries are made about previous pregnancies and labours.

ADVICE TO THE PATIENT.—Especially with a primigravida this is often required, and should be on the following lines:

- (a) Pregnancy is a natural state and nothing to be alarmed at; we mostly came into the world in the same way, and, presumably, always shall.
- (b) Reasonable exercise in the form of walking, household duties, shopping, etc., is good, but the patient should not stand for long periods of time (the queue habit is most pernicious); golf, "matronly" tennis or badminton, cycling, croquet and swimming are all beneficial, but horse-riding, squash racquets or any exercise in which violent or unexpected movements may occur is not allowed; and she should not get overtired; so far as games are concerned, great care should be taken at the time of the first three missed periods.
- (c) Marital intercourse may continue normally, but if there is any history or indication of abortion, it should be avoided at the time of the first three missed periods. The aesthetic sense of the partners will suggest when it should cease in later pregnancy.
- (d) The bladder should not be allowed to remain full, nor should the patient get constipated, but on the other hand she should not take aloes or castor oil. However, liquid paraffin, Agarol, Petrolagar, phenolphthalein, Milk of Magnesia, Lixen, senna tea, Calsalettes or cascara are all suitable if a laxative is required.
- (e) At least eight hours should be spent in bed at night, and rest taken in the afternoons if the weather is hot.

DIET.—This should include plenty of fluids and good fresh food, with plenty of vegetables and fruit; hot curries, pastry and greasy foods must be avoided; eggs are good, as are meat and fish in moderation. It is not necessary to drink great quantities of milk; it does not get converted into mother's milk, and it merely makes the mother fat.

MINOR AILMENTS.—Indigestion, especially in the later months, is often due to hyperacidity and is cured by bicarbonate of soda, Milk of Magnesia, Maclean's powder or a carminative mixture.

A pregnant woman should take calcium and iron in some form; they guard against anaemia and toxæmia, and there is some evidence that the teeth of the child are improved if the mother takes calcium. Caldefferrum tablets, one three times a day after food, are a convenient and economical method, or the iron and calcium may be given separately. Both should be given throughout pregnancy and lactation.

Vitamins in the form of a Magvita, or yeast tablets two or three times a day should be given throughout pregnancy. Vitamins are

of particular value in India, where the poorness of the food, especially in the vitamin B complex, encourages anaemia of pregnancy.

DIAGNOSIS OF EARLY PREGNANCY

SYMPTOMS.—Amenorrhoea in a previously regular young woman usually means pregnancy. Frequent micturition, and a sense of fullness in the lower abdomen and the breasts, and slight anorexia, indigestion or nausea are among the commonest early symptoms.

SIGNS.—In a thin woman, enlargement of an anteverted uterus can be detected six or eight weeks after conception, but obesity, muscularity or retroversion make things much more difficult, and the softness of the newly pregnant uterus makes it difficult to define. The most trustworthy signs are softening of the cervix, which begins in the centre, and Hegar's sign, which is present between the sixth and the tenth weeks. This sign means that the examining vaginal and abdominal fingers can be made to meet above the cervix owing to the thinness of the lower uterine segment. The breasts are firmer than normal, and in fair-skinned people veins can be seen under the skin; Montgomery's follicles are seen as small spots in the areola round the nipple.

BIOLOGICAL TESTS.—The *Friedman Test* is the one most generally used, but the difficulty in India is that the 4 to 5-months-old virgin female rabbit necessary for its performance is not always obtainable at short notice. The larger hospitals, however, generally keep a stock of animals. If the age or virginity of the rabbit is in doubt it is necessary to do a preliminary laparotomy in order to observe the state of the ovaries.

The test is simple to carry out; 10 c.c. of patient's fresh, filtered urine (either mid-stream or catheter specimen, collected in a sterile vessel) are injected into a vein in the rabbit's ear; forty-eight hours later the rabbit's abdomen is opened and the ovaries are examined; in a positive case red follicles will be seen. The test is 98% accurate, and the patient's urine gives a positive result three weeks after conception.

The *Aschheim-Zondek test* is similar in principle, but is carried out on a virgin female mouse between 3 and 4 weeks old. Half a c.c. of the patient's urine is injected subcutaneously every eight hours for two days (6 injections) and the mouse is killed on the fifth day. A positive case shows haemorrhagic follicles in the ovaries. In practice, five or six mice are used, and one positive ovary is considered a positive result.

These tests are, of course, positive in extra-uterine gestation, and strongly positive in cases of hydatidiform mole.

Prostigmin.—When a patient's period is a few days late give her an injection of one ampoule of Prostigmin every day for five days, or two injections every day for three days. If she is pregnant nothing will happen; otherwise, the delayed period will begin. The writer has found this test very trustworthy.

PELVIMETRY.—This need be carried out only in a

primigravida, or in a multipara whose history suggests obstructed labour. Average measurements are:

Interspinous	..	..	..	..	10 inches (25½ cm.)
Intercristal	..	..	..	..	11 " (28 ")
External conjugate	..	..	..	..	7½ " (19 ")
Diagonal internal conjugate	..	..	..	..	4½ " (12 ")
Diameter of the outlet (i.e., distance between ischial tuberosities)	..	..	..	..	4 " (10 ")

In Indian women they are ½ to 1 inch less. These measurements are of more value in rousing one's suspicions of pelvic contraction than in giving exact information.

A good rough guide is the following. If you cannot reach both the anterior superior spines by stretching the fingers of one hand, if you can only just reach the promontory of the sacrum vaginally, and if you can get your clenched fist between the patient's tubera ischii, there is no pelvic contraction of any consequence.

If a minor pelvic contraction is found, its probable effect on labour can be judged only in the latter part of pregnancy, when the foetal head can be used as a pelvimeter in the manner described later.

X-rays give exact information about the size of the pelvis and the size and position of the child; ideally, every primigravida should be X-rayed in the last month of her pregnancy, and every multipara if there is a history of previous long labours or a suspicion of trouble ahead.

The writer's method of exactly measuring the true conjugate (the most important diameter in the pelvis) is to put one point of a pelvimeter on the 5th lumbar spine and the other on the pubes; the distance between the points is noted, and a lateral picture taken with them in position. By measuring the distance between them on the photograph, it is then a simple matter of arithmetic to calculate the true conjugate; the only drawback is that the photograph must be well taken or it is difficult to identify the inner surface of the pubic arch. A picture of the brim and of the presenting part is, of course, taken too. The "lumbar-puncture space", between the 3rd and 4th lumbar vertebrae, is on the line joining the highest parts of the iliac crests; it is almost unnecessary to add that the 5th lumbar spine is the next below the 4th.

TO CALCULATE THE DATE OF DELIVERY.—Go back three months from the first day of the last menstrual period, and go on 10 days for a primigravida, 7 days for a multipara, e.g., last menstrual period began on 1st January, delivery probable on 11th or 8th October.

The average pregnancy is generally considered to last 275 days, and there is some evidence that fertilization takes place 14 days before a period is due, but there are many conflicting opinions on this subject.

When the date of the last period is not known, a rough estimate

can be made from the height of the fundus uteri, which occupies the following positions:

At 3 lunar months (12 weeks)	..	Just above pubes
" 6 " " (24 ")	..	At umbilicus
" 9 " " (36 ")	..	At xiphisternum
" 10 " " (40 ")	..	An inch lower
(term)		

Quickening takes place roughly at the 18th week, which is about the end of the fourth calendar month.

In a primigravida the foetal head becomes fixed in the pelvis 3 to 4 weeks before labour, but in a multipara it may not fix until term or a few days before. Most of the points to which attention must be paid will be found in the following form, which in practice will be found a simple and useful help in an ante-natal clinic.

ANTE-NATAL DETAILS

	Date
1. Name	Age
Address	
Last Period Began	Expected Date.... .
Bowels	Vomiting.... .
Previous Illnesses, Abortions, etc	
..... .	
..... .	
Previous Labours. Number	..... .
Punctuality .	..... .
Duration . . . . .	..... .
Stitches and Complications .. . . .	..... .
.....
Duration of Breast-feeding .. . . .	..... .
Remarks .. . . .	..... .
.....
2. Measurements. Interspinous.	Intercristal
Ext. Conj	Diag. Conj.
Outlet	
Uterus, Position, Height, etc.... .	..... .
Breasts	Heart..... .

Lungs Spleen.....
 Blood-Pressure..... Urine: Albumin..... Sugar.....
 Haemoglobin..... Blood Count.....
 Remarks.....

3. *Foetus*. Date of Quickening..... Heart Sounds.....
 Movements Presentation.....
 Remarks.....

Date	Subsequent Visits		<i>Foetus and Uterus.</i> <i>Presentation, Fixation, Size, etc.</i>
	Urine	Blood-Pressure	
..
..
..
..
..
..
..
..

- 5 *Labour*. Date and brief details.....

THE ANAEMIAS OF PREGNANCY (V. B. Green-Armytage)

The occurrence of moderate grades of anaemia, apart from loss of blood, focal sepsis and obvious toxæmia, during the progress of pregnancy, has long been a matter of common observation. Indeed, such anaemia occurs in 75% of all women during the first two trimesters, and in 70% becomes most marked during the last three months. This being so, it is all-important that you should realize that there are four fairly common and two rare clinical groups of anaemia which may cause you and your patient grave anxiety.

Until recently it has been the custom to explain any diminution of erythrocytes or haemoglobin as being physiological, and due to the breaking down of these substances in the placenta for the purpose of supplying the foetus with the necessary iron, copper,

manganese, etc., for its nutrition and blood formation; but in that many such women are capable of gaining half a million of red blood cells per c.c. within a week of parturition, it is very probable that much of the moderate anaemia of the carrying period is due to hydraemia, or increase of the plasma content of the blood.

In this *first group* the patient is often badly nourished, and, in consequence of the large demand upon maternal circulation, it is not uncommon to see oedema of the lower extremities and even of the abdomen, without any albuminuria. This type is to be seen in any large ante-natal clinic. They suffer from a sense of fullness in the limbs and abdomen, they are short of breath, their vision is dulled, they are easily fatigued, and often they will say the baby hardly moves in the abdomen. The blood examination shows a decrease of red blood cells and haemoglobin, and an abnormal amount of serum will be found above the clot. The prognosis in these cases of hydraemia without renal upset is good. The treatment consists in sunlight, moderate rest with a full diet (*vide infra*), and the exhibition of iron in the form of fresh Bland's mass, 90 gr. a day, or Ferri et Ammon. Cit. 30 gr. three times a day.

Group II is perhaps as often seen in general practice as in hospital patients. It occurs in young and old, primiparae and multiparae. It is often associated with gastro-intestinal disturbances, and a diet that has long been poor or is at the moment deficient in those specific substances necessary for the function of haemopoiesis, namely, proteins, fruits, and green vegetables. Many of these patients have or have had hyperemesis. Others have no appetite, and constipation is obstinate. When properly investigated, nearly all these women have been shown by Castle to have hypochlorhydria or achlorhydria accompanied by a reduction or inactivity of the enzyme, pepsin.

A blood picture shows hypochromia with a marked reduction in haemoglobin, but a less marked diminution of red blood cells. The erythrocytes are small (*microcytes*), and frequently vary in shape. Megalocytes are not seen, but normoblasts may be present. The leucocytes, if anything, tend to be relatively increased. These changes, if treatment is not actively instituted, rapidly progress, and are accompanied by symptoms of great prostration, throbbing in the head, dyspnoea and oedema. Albuminuria is occasionally present, and in the untreated patient miscarriage is by no means uncommon. In the puerperium, white-leg is peculiarly frequent—a regrettable sequence of events in a curable condition. Should, however, the patient go to full term, it is a remarkable fact which I have often observed, that the labour is a brief one, and is very rarely accompanied by any post-partum bleeding.

In default of any evidence of actual loss of blood or sepsis, it is not easy to comprehend and explain the degree of anaemia to which such patients may descend. Some have presumed that a toxin is produced by the *fœtus* or *placenta*, which causes haemolysis, but no such factor has ever been discovered. Others have thought there is toxic inhibition of the bone marrow, but in this type there

is no megalocytosis or leucopenia such as occur in pernicious anaemia.

But if the practitioner will bear in mind the fact that there is a reduction in the free HCl, and total acidity of the gastric juice accompanied by lessened peptic activity, and that the degree of anaemia tends to increase as the pregnancy proceeds, he will realize that it is the diminution of haemoglobin building materials in the food, together with a lessened ability to utilize such materials after ingestion, that is responsible for this type of anaemia. Moreover, when it is remembered that every foetus *in utero* is a parasite, and in this particular type of case is born at term with an absolutely normal blood count, and a liver fully stored with iron, copper, zinc, etc., it will be understood that the demand of the foetus for such haemoglobin building materials has been made at the expense of the parent, and is exactly comparable in its effect upon the hypochlorhydric mother as visible and repeated blood losses would be.

This being so, the outlook, provided the clinical condition has been recognized early, is good, for the treatment is mainly that of sunlight, diet (*vide infra*), and the provision of food containing those intrinsic and extrinsic factors in proteins, vegetables and fruits which stimulate haemopoiesis and the assimilation of iron and other metals. Raw liver, from 200 to 400 gm. per diem, is, I think, more valuable than pharmaceutical extracts. Most excellent results may be expected from 15 gr. of fresh Bland's mass six times a day, and 30 mm. of dilute hydrochloric acid well watered *ter die*. Blood transfusion is rarely necessary, and has no scientific argument in its favour.

Group III.—This is a very grave variety. The anaemia begins early in pregnancy, and is associated with profound inanition. The patient has a waxy appearance, frequently the spleen is palpable, and there is a daily rise of fever, which may simulate typhoid. The tongue is sore, and in some patients retinal haemorrhages may occur. Paraesthesia and anasarca are occasional symptoms. Some albuminuria is frequently present. Rarely is there any hypochlorhydria or achlorhydria.

The blood picture is almost indistinguishable from that of Addison's pernicious anaemia. The colour index is above 1, that is, the number of red blood cells is more markedly diminished than the amount of haemoglobin. The erythrocytes show marked variation in shape, and there are always megalocytes in the blood, which means a pathological proliferation of megaloblasts in the bone marrow.

At this stage, will you pardon a digression by my reminding you that in health red blood cells develop smoothly from the primitive reticulo-endothelium, through megaloblasts and normoblasts to erythrocytes, and that very few megaloblasts can be recognized in the bone marrow, but should the nutrition of the blood-forming organs be disturbed, either from defective diet or from failure of digestion and assimilation in the alimentary canal, the orderly

ripening of red cells may be disorganized and the process be arrested at one or other of these levels (*see* Anaemia).

I have seen a few examples of this group in England, and vast numbers of them in the tropics, both in Europeans and indigenous people. Perhaps many of you also may have met with cases, for, due to our far-flung Empire and modern rapid methods of transit, this type of anaemia in pregnancy may be encountered in any general practice, which includes patients who have been overseas.

Sometimes this megalocytic type of anaemia is found in those who have never been out of England, and is of the true Addisonian type, due to deficiency of Castle's extrinsic factor in the diet, or lack of his intrinsic haematinic principle in the stomach and intestine. These cases react excellently, if diagnosed early, to liver-ventriculin treatment, diet, and, if need be, blood transfusion.

In practice, you must have seen exactly similar types of megalocytic anaemia in patients suffering from chronic intestinal ulceration, partial obstruction, colic fistulae, or infections with such parasites as *Dibothriocephalus latus*. Maybe you have met with it in cases of coeliac disease and sprue.

But these megalocytic anaemias in pregnancy cases which you encounter in the East, or here, in women from the tropics, are, thanks to the brilliant research of Lucy Wills, now proven to be more often due to lack of the extrinsic factor (vitamin B complex) in the diet than to the intrinsic factor. This is very important from a treatment point of view, for whereas hitherto such cases were often treated by liver or stomach preparations, and there was no reticulocyte response, now, due to her work, we can practically assure recovery by giving Marmite, $\frac{1}{2}$ to $\frac{3}{4}$ oz. a day, with or without repeated small blood transfusions, and the previous dietetic methods mentioned.

Labour in these cases is astonishingly bloodless, and post-partum haemorrhage I have never seen, but there is a grave risk, unless treatment has been adequate, of cardiac and obstetric shock a few hours after childbirth. The baby is born with a normal blood count, but is very prone to waste and develop rickets later, if not urgently treated *de novo*.

Occasionally, some of these megalocytic anaemias of pregnancy are resistant to Marmite treatment, just as are the true pernicious type to liver treatment alone. This fact would suggest that in some cases there is a combination of extrinsic and intrinsic factor deficiency. In such it is an easy matter to combine Marmite treatment with oral and intravenous or intramuscular injections of liver extract.

Arsenic I have rarely found beneficial in these first three groups of anaemia during pregnancy, but I have observed a clinical fact of some importance, and that is, megalocytic types of anaemia do not tend to relapse or recur in a subsequent pregnancy, if the primary treatment is efficient.

Group IV is the true haemolytic type, and is due to destruction of the red blood cells by toxins or organisms in the blood. It is seen in any acute infection accompanying pregnancy, and may be

associated with focal sepsis in the teeth or tonsils. T.N.T., or lead poisoning, malignant malaria, etc., are also causes of haemolysis. Often it is part and parcel of that enigmatic condition we speak of as "toxaemia of pregnancy", which may go on to acute yellow atrophy of the liver, eclampsia or accidental haemorrhage, but most frequently it is combined with profound sepsis after childbirth. This type of anaemia is the most serious of all, the blood destruction often being of astounding rapidity, and accompanied by red blood cells and copious albumin in the urine. Unless the causative factor can be eliminated or checked, the prognosis, despite all measures, including blood transfusion, is hopeless.

Group V is a different and more hopeful matter in that in this type the anaemia is due to sudden post-partum haemorrhage, or small repeated losses due to fragments of placenta which have been permitted to remain without evacuation after abortion or childbirth. Fortunately these accidents rarely occur with modern improvements in ante-natal and intra-natal treatment.

Post-partum haemorrhage reflects very severely on the attendant, but if large doses of iron are given for the anaemia, the "pick up" is rapid and satisfactory, provided sepsis is not present and the uterus is entirely empty. Chorion epithelioma after hydatidiform mole is sometimes a cause demanding immediate recognition and surgical treatment.

Group VI includes less than 5% of all the anaemias of pregnancy, and is made up of such rare diseases as leukaemia, splenic anaemia, purpura haemorrhagica and Hodgkin's disease. These we need not consider here.

In conclusion, may I be permitted to enumerate those food substances which particularly contain iron, copper and manganese, together with the vitamins A, B, C, D and E. They are: asparagus, almonds, beef (lean), beans (kidney), barley, carrots, cheese, eggs (yolk), green vegetables (especially lettuce and spinach), liver, oatmeal, oysters, peas, pea-nuts, potatoes, prunes, raisins, walnuts, wheat.

Milk and fruit, such as apples, bananas, oranges and grapefruit, contrary to the general lay view, contain these metals in infinitesimal quantities.

Marmite is an autolysed extract made from brewer's yeast. Its haemopoietic factor is water and alcohol soluble and heat stable. It is possibly a protein breakdown product.

VOMITING OF PREGNANCY

Morning sickness does not always happen in the morning, and is apt to be worse when the patient is constipated or hungry. One or two attacks of sickness in the day are quite usual, and generally begin some two or three weeks after the first missed period; in an ordinary case the patient can be assured that the sickness will cease when she feels the baby move—that is at about the eighteenth week.

Glucose is a good remedy, and should be taken as often as the patient likes, a strong solution being better than a weak one. A cup

of tea, some Horlicks, some boiled sweets or barley sugar at odd times of the day will often work wonders. Gardenal, in quarter-grain doses, bromides, a few drops of tincture of iodine in water, or a carminative mixture are all useful in mild cases. Sometimes a patient will discover a remedy herself, one of the writer's being completely cured by taking some sal volatile in water as soon as she felt the sickness coming on, while another found a teaspoonful of Eno's Fruit Salts, or the addition of a little gin to the glucose solution made all the difference.

HYPEREMESIS GRAVIDARUM.—*This is of two types—neurotic and toxic, the former being much the commoner.*

NEUROTIC VOMITING.—*This is not, in the writer's experience, exclusively confined to the neurotic type of woman, but is certainly commoner with an unwanted pregnancy; it may also occur in the opposite circumstances, namely, when the mother is particularly anxious to have a baby.*

Treatment.—If the simple measures and remedies suggested under Vomiting of Pregnancy fail, it is better to take the patient into hospital and to exclude sympathetic relatives; this measure alone may have a very beneficial effect.

A daily injection of oestrogen 20,000 to 50,000 units improves and often cures these cases, alternatively, Serogan may be given, or placental extract (Human Immune Globulin). The patient should be kept in bed and mild laxatives given to ensure regular action of the bowels. A mixture containing 10 grains each of bromide and chloral is given three times a day; if liquid medicines cannot be kept down, give half a grain of Gardenal three times a day.

Psychotherapy is often a great help, but it is important that the patient should not think she is being regarded as a mental case, or the effect will be bad.

Food.—Small frequent meals should be given, and the patient encouraged to suck barley-sugar; it is an excellent thing for the nurse or doctor to be present at a certain number of meals so as to encourage the patient, to distract her attention from her neurosis, and to congratulate her when she keeps her food down, as she often will with suitable encouragement, or sometimes after a reprimand.

These patients generally sleep well, have no fever, do not lose weight, retain a clean moist tongue, and characteristically bring up white, frothy material, but the vomit may be bile-stained. Occasionally there is a hysterical fit. If there is any sign of dehydration, rectal glucose-saline drip is the treatment, or intravenous glucose-saline to which 10 units of insulin may be added.

TOXIC VOMITING.—*This is both rare and serious: it may follow neurotic vomiting and, like eclampsia, is associated with liver and kidney damage. It may begin suddenly or gradually, and is characterized by uncontrollable vomiting, followed later by fever, rapid pulse, dry brown tongue, and considerable dehydration; in the later stages, the vomit is brown, and there is albumin in the urine.*

Treatment.—Fluid should be given by vein and rectum, and if

vigorous treatment on the lines advocated for neurotic vomiting is unsuccessful within 48 hours, the pregnancy should be terminated. *Even in neurotic cases it is important not to continue palliative measures for too long.* If, in spite of treatment, any patient with hyperemesis is losing weight, and has a dry tongue with a rising pulse and temperature, she should be aborted without delay. In the terminal stages these patients go downhill very rapidly, and unwilling though one may be to decide on abortion, it is better to carry it out too early than too late.

An ingenious surgeon in Ireland, faced with religious prejudice against abortion, performed jejunostomy on a patient and fed her through a jejunostomy tube until term.

HAEMORRHAGE IN EARLY PREGNANCY

This is usually due to abortion or ectopic gestation; some cases may be due to low implantation of the placenta, and others to there being a vacant space below the ovum, to a polyp or to a fibroid in the cervix, or even to carcinoma. Sometimes no cause can be found, although certain cases appear to be due to a toxæmia; finally, some women say they menstruate throughout pregnancy.

Threatened abortion should always be assumed and treated until another cause is found; because of its danger ectopic gestation should never be forgotten.

ABORTION

This occurs most commonly between the 8th and 13th week of pregnancy because after the latter date the placenta is formed and firmly embedded in the endometrium.

CAUSES.—Criminal or ethical interference, violent purges, quinine and occasionally lead poisoning, physical injury and emotional shock, syphilis, nephritis and acute fevers, cervicitis, retroversion, maldevelopment, fibroids, and ovarian cysts, avitaminosis, particularly of vitamin E and lack of hormones, particularly Prolan B and progesterone (Lutocyclin), and hydatidiform mole. A certain number of abortions seem to occur after a quite trivial accident or even after intercourse at about the time of the second or third missed periods, when the uterus appears to be particularly sensitive, and a certain number have no ascertainable cause but are "just one of those things", or are possibly associated with the Rh factor (*see below*).

VARIETIES.—These are generally divided into five: Threatened, inevitable, incomplete, missed and habitual.

THREATENED ABORTION is by far the commonest kind and is often amenable to treatment, the classical sign being a slight, painless hæmorrhage.

Treatment.—

- (a) Find out if the patient wants to have the baby, otherwise treatment will be useless. If she does, proceed as follows:
- (b) Put the patient to bed and raise the foot-end about six

- inches. The effect of this is partly psychological; the unusual angle of the bed reminds the patient that she must stay in it.
- (c) If the patient is nervous or sensitive, do not do a vaginal examination, or it may have the very result one is trying to avoid. With a quiet patient, however, a gentle well-lubricated examination should be done to find out:
- (i) Whether the uterus is enlarged.
 - (ii) Whether it is retroverted or contains any fibroids.
 - (iii) Whether the cervix is open or not—if it is open the abortion is inevitable and palliative treatment is useless.
 - (iv) Whether there is any fullness, throbbing or tenderness in either fornix, indicating ectopic gestation (always suspect this when pregnancy occurs after a long interval).
- (d) If, after history-taking and examination, the case is considered to be one of threatened abortion, give an injection of morphia or Omnopon gr. $\frac{1}{4}$, with gr. $\frac{1}{16}$ of atropine. Also give an intramuscular injection of 5–10 mg. progestin (Lutoecydia, Progesterone, etc.). Give vitamin E, one capsule three times a day, by mouth.
- (e) Keep the patient in bed and repeat the progestin daily until there has been no haemorrhage for a week. Vitamin E should be continued for the remainder of the pregnancy. Parke Davis's well-tried Liquor Sedans should also be given. The bowels may be relieved on the third day by an olive-oil enema.
- (f) If, as often happens, the uterus is found to be retroverted, it is better to leave it as it is for the present, as manipulation may cause abortion, but it should be rectified before the patient becomes pregnant again.

Note.—When the placenta has fully formed—that is, by the 16th week—progestin is not required in order to keep it in place, so its administration should be cut down or discontinued.

INEVITABLE ABORTION.—The signs that this has occurred are considerable haemorrhage, rhythmical pains and a patent cervix.

Treatment.—This depends upon the severity of the haemorrhage and the presence or absence of sepsis. If sepsis is present there has been *mechanical interference*.

If the bleeding is severe give the patient an injection of 1 c.c. Pituitrin or Pitocin, take her to the theatre and evacuate the uterus. If she cannot be moved or if there is no theatre available, operate only if you are satisfied that the surroundings are reasonably aseptic, otherwise do your best with Pituitrin, ergot, calcium and haemoplastin injections.

Evacuation of the uterus is carried out as follows:

- (a) Anaesthetize the patient (intravenous anaesthesia does very well).

- (b) Put her in the lithotomy position with the buttocks well over the edge of the table.
- (c) Clean up the surrounding skin and paint it with iodine or mercurochrome, or wash it with 30% Dettol, and shave it if this has not been done.
- (d) Swab out the vagina and remove all clots, etc. Keep clots for examination later.
- (e) Insert a vaginal speculum, catch the cervix with a vulsellum and dilate the cervix with dilators as necessary.
- (f) Wash out the uterus, by means of a Rheinstädter blunt flushing curette, with a hot (110° F.) solution of weak (just cloudy, not opaque) Dettol. Lightly rub (do not scrape) the uterine walls with the beak of the curette.
- (g) Remove the curette, insert a pair of ring or ovum forceps and "fish out" all the remains possible.
- (h) Repeat the curette manoeuvre.
- (i) If the cervix admits a finger, have a good "sweep round" the cavity of the uterus with the gloved right forefinger to make sure that the uterus is empty. If not, empty it with the finger, forceps or curette.

Note.—Do not mistake the shaggy feel of denuded endometrium for chorionic remains. Some operators begin by sweeping their finger round the uterus, but I have always found the method described above better, provided that the instruments are used with the *utmost gentleness*.

- (j) Antevert the uterus.
- (k) Give the patient an injection of some ergot preparation and put her back to bed. If all is well she can get up on the third day.

The septic case calls for more consideration; Green-Armytage advises leaving it strictly alone until the temperature and leucocyte count have been normal for five or six days. This, however, is not likely to happen so long as there is a septic focus in the uterus. A safe method of expelling the uterine contents, when septic, is to give the patient 1 c.c. of Pituitrin or Pitocin, and to insert some sterile glycerin into the uterus through a catheter. If this is not enough, the contents may be gently separated from the uterine wall by a gloved finger. Curetting is contra-indicated because it breaks down the natural defences and opens up the uterine sinuses.

Needless to say, all septic cases are given chemotherapy.

INCOMPLETE ABORTION.—*Treatment* is on similar lines to that of inevitable abortion. After the placenta begins to form (about the 13th week) practically every abortion that occurs is incomplete, and consequently needs surgical treatment; the reason is that the young placenta is more firmly embedded in the uterine wall than either the early chorion or the mature placenta, so pieces of it get left behind.

MISSED ABORTION occurs when the ovum is dead and a mole

has formed. This may be *carneous* (i.e., clotted blood) or *hydatidiform* (vesicular), which is an extravagant grape-like hypertrophy of the chorionic villi. It may be suspected if the uterus is too large for the calculated date, and if there is a watery discharge; if the characteristic grape-like vesicles are passed, the diagnosis is confirmed.

Treatment.—This consists in dilatation and blunt curettage. In about 5% of these patients *chorion-epithelioma* develops, so a close watch is kept for some months for haemorrhage or for enlargement of the uterus; even when secondary deposits have formed, cure has followed hysterectomy.

HABITUAL ABORTION.—The causes are as given in the second paragraph of this article.

Treatment.—Have a Wassermann or Kahn test done on the blood, test the urine for albumin, and examine the blood-pressure.

Carefully examine for cervicitis, lacerations or retroversion, and also for fibroids, ovarian tumours or cysts.

Correct any abnormality found; the radially applied cautery for cervicitis, a trachelorrhaphy (*not* an amputation of the cervix) for lacerations, or a Gilliam's operation for retroversion, will often have a happy sequel or even sequels; a myomectomy for fibroids or removal of an ovarian cyst may act similarly.

If no obvious cause is found, next time the patient becomes assuredly pregnant, put her in bed and keep her there (and away from her husband) until about the 18th week, when quickening should occur. Give vitamin E three times a day throughout the pregnancy; give *Liquor Sedans* up to about the sixth month, and give 5 mg. of progestin twice a week (or once daily by the mouth) until the 16th week. The patient may then get up, but if there is any sign of a threatened abortion, she must be treated as already described.

Constipation is best avoided by *Petrolagar* or *Agarol* and an olive-oil enema when required. The patient can use a commode for defaecation, but a bottle is better for micturition.

THE RH FACTOR AND ABORTION

Among human beings, some 85% (the percentage being higher in Negroes and the Irish) contain in their red cells a substance known as the Rh factor, so called because it is present in Rhesus monkeys. Such people are called *Rh positive*, the remaining 15% being called *Rh negative*.

There are two very interesting points about the Rh factor; first, it is hereditary, so can be transmitted from an Rh-positive husband to the child of an Rh-negative wife (*actually it is a dominant characteristic*); secondly, if the red cells of an Rh-positive person are repeatedly injected into an Rh-negative person, the latter develops an antibody capable of destroying them.

It is now thought that certain cases of habitual abortion are caused by the fact that the red cells of the foetus inherit the Rh factor from the father, but the mother, being Rh negative, develops

in her serum an antibody which haemolyses the red cells of the foetus. This, however, is not the whole story, for two obvious reasons; the red cells of the normal foetus do not come in contact with the maternal blood-stream and, further, millions of Rh-negative women have had normal children by Rh-positive men. One explanation given is that in certain cases there is a placental leak, which allows some of the foetal red cells to enter the maternal blood-stream and so generate antibodies. This might explain the cases mentioned above, where abortion follows a quite trivial accident. Much more research is needed on the subject, but it has often happened that a couple who were either barren or abortive have married new partners and have each had healthy children, and *certainly many a barren widow has had children on remarriage*. It is safe to conclude that in cases of habitual abortion the Rh factor of the partners should be tested.

TO FIND THE POSITION OF THE FOETUS AT OR NEAR TERM

There are four chief methods—abdominal palpation, auscultation, vaginal examination and X-ray examination.

ABDOMINAL PALPATION.—

- (a) Tell the patient to empty her bladder.
- (b) The usual plan is to work from above downwards—in other words, to palpate the fundus first, then the sides of the uterus and then the lower pole.

In a vertex presentation the firm but even breech is felt at the fundus, and the whole foetus moves when the examiner's hand grips it and rocks it from side to side. A head feels globular and can be wobbled about, and there is a groove between it and the body.

Most people cannot deduce much with certainty from feeling the sides of the uterus, but with training it is possible to distinguish the firm, even back from the irregular and sometimes moving limbs.

Pawlik's Grip, the traditional name for gripping the lower pole of the foetus between the thumb and fingers of the right hand, gives considerable information. It tells us:

- (i) Whether or not the breech or the vertex presents. The breech has not the bony hardness of the head, nor is there a groove where the neck is, nor, if it is not fixed, can it be halloated like the head without moving the body of the foetus.
- (ii) Whether the presenting part is engaged in the brim or whether it is floating above it.
- (iii) Whether the presenting part will engage. Firm pressure is made on the fundus, and if the presenting part fixes, it has entered the pelvis.
- (iv) In a vertex presentation the lie of the foetus can often be made out by this grip alone, because the forehead of the foetus is higher than the occiput, so if the finger

of the examiner's right hand is higher (i.e., nearer the mother's navel) than his thumb, the child's occiput is facing to the mother's right, and vice versa.

Abdominal palpation may give little information with certainty when the patient's muscles and uterus are firm or when she is fat.

In a twin pregnancy, the most striking thing about abdominal palpation is that it is difficult to be certain about anything except that there seem to be a great many limbs.

In an occipito-posterior presentation, there is often a curious flatness above the pubes, sometimes mistaken for a Bandl's ring by the inexperienced.

AUSCULTATION.—A doctor generally hears best with his own binaural stethoscope. The situation of the foetal heart is quite a valuable confirmatory guide to the position of the foetus.

If the heart is louder above the mother's umbilicus than below, the presentation is probably a breech.

If the heart is loudest in the mother's flank, the presentation is probably an occipito- (sacro-) posterior.

If the heart is loudest just to the left or right of the mother's middle line, the presentation is probably a left or right occipito- (sacro-) anterior.

In a case of twins, independent observers listening at the same time in different places hear different numbers of heart beats. The best method is, when both observers can hear the heart beats for one observer to give the signal to start counting; he gives the signal to stop as he listens to the hundred-and-fiftieth beat. The observers then compare results, and repeat the process if necessary.

VAGINAL EXAMINATION.—This must be carried out with aseptic precautions, and is most valuable. If the sutures of the foetal head can be felt through the lower segment it helps to indicate the presentation; it also shows that it is not a breech.

The state of the cervix is examined, whether it is "taken up" or not, whether it is closed or open, whether the placenta is "prævia".

Munro Kerr's method of pelvimetry by the foetus is the most valuable clinical way of finding out whether the baby can be born. With two fingers in the patient's vagina and the thumb pressing over the top of the pubes (the patient's bladder must be empty), exert firm pressure on the head with the other hand, preferably aided by an assistant's hand on the fundus, and "try to push the baby out". If the presenting part is felt to be well behind the pubes all will be well, but if it bulges over the pubes there is disproportion.

X-RAY EXAMINATION.—In all doubtful or suspicious cases, when there is any question of multiple pregnancy or of any foetal deformity, and preferably in every primigravida near term, an X-ray picture should be taken. The idea that the taking of an X-ray photograph can harm mother or child is nonsense.

ANTE-PARTUM HAEMORRHAGE

ACCIDENTAL HAEMORRHAGE.—This is haemorrhage not due to placenta prævia, and may be toxic or non-toxic, the former having

some points in common with eclampsia, whereas the latter may have no evident cause or may be associated with nephritis or injury. In one case, after the writer had performed cephalic version on an elderly primipara with a breech presentation, the foetal heart sounds ceased almost at once and blood began to ooze from the vagina. When the dead child was born the cord was found to be round the neck and it was evident that the placenta had become detached during the version. Subsequent deliveries were normal.

Accidental haemorrhage can be Revealed or Concealed, according to whether it escapes through the cervix or not; when it is concealed the uterus enlarges and becomes very tense, and the patient is much more ill than the circumstances seem to justify.

Concealed Accidental Haemorrhage.—

Treatment.—This can be summed up as morphia and blood transfusion followed by Caesarean section.

Revealed Accidental Haemorrhage.—

Treatment.—This is to rupture the membranes, apply a tight binder and give an injection of $\frac{1}{2}$ c.c. of Pituitrin. If labour has not started the vagina should be packed as well. If there is obstruction to labour do a Caesarean section, and if the case is a breech pull down a leg. In all cases give a transfusion whenever possible, and remember the maxim—never operate during shock.

PLACENTA PRAEVIA

Painless, apparently causeless, attacks of haemorrhage in the last two months of pregnancy or early in labour mean placenta praevia. The amount of blood may be large or small, and the blood may be bright or clotted. Characteristically, the first haemorrhage occurs a few weeks before term, stops of its own accord, and recurs a few days later. The loss of blood tends to be greater during labour than before it. It may be started also by a vaginal examination.

TREATMENT.—

- (a) Put the patient in hospital.
- (b) Find out whether the foetus is alive and viable.
- (c) Do a gentle vaginal examination to determine:
 - (i) The degree of dilatation.
 - (ii) The situation of the placenta.
 - (iii) The presentation of the foetus.

With a Lateral or Marginal Placenta

- (d) Rupture the membranes, put on a tight binder, and inject $\frac{1}{2}$ c.c. of Pituitrin.
- (e) If haemorrhage continues and the os is closed, plug the vagina with gauze impregnated with glycerin and Cibazol powder.
- (f) If the os admits two fingers apply Willett's forceps to the baby's scalp or do a podalic version and pull down a leg. Tie a one-pound weight to the Willett's forceps, or a two-pound weight to the foot, and await delivery.

With a Central Placenta:

- (g) McCann's fundal Caesarean section is the method of choice (*see Caesarean Section*).
 (h) If Caesarean section is impossible, and the cervix is closed, proceed as in (d) and (e) above; if it is open, perforate the placenta and proceed as in (f).

With a closed cervix it is not easy to determine the situation of the placenta, but the child's head tends to be high when it is central, and a spongy mass may be felt round or to the side of the cervix.

It is needless to add that blood transfusion, plasma or intravenous glucose-saline should be given when haemorrhage is severe.

Caesarean section is particularly indicated in good surroundings when the foetus is alive and the duration of pregnancy more than 35 weeks.

Although placenta praevia is commoner in multiparae it does occur in primiparae, especially, perhaps, elderly ones; in such cases when the os is not dilated, Caesarean section holds out the best—sometimes the only—hope of saving the life of the mother and child.

ANALGESICS IN LABOUR

TWILIGHT SLEEP.—Morphia gr. $\frac{1}{4}$, hyoscine hydrobromide gr. $\frac{1}{16}$ is the usual injection, followed by hyoscine gr. $\frac{1}{16}$ every two hours, morphia gr. $\frac{1}{4}$ being given with alternate injections—that is, every four hours. These are given only if the patient shows signs of coming round. *Morphia must not be given within four hours of the expected time of delivery or the child may be born in blue asphyxia* because morphia depresses the respiratory centre. Omnopon may be given (gr. $\frac{1}{4}$) instead of morphia gr. $\frac{1}{4}$.

BARBITURATES.—The first injection of morphia and hyoscine as above may be accompanied by the oral administration of Amytal Sodium or Seconal, three grains, or Dial, five grains, repeated after one hour. This generally causes the patient to pass into a confused analgesic state from which she does not recover for four or five hours, and of which she remembers nothing afterwards; when necessary, the barbiturate may be repeated every four hours until the baby is born; when the child's head is on the perineum the mother may be given chloroform in the ordinary way.

PETHIDINE.—An injection of 100 mg. causes, in most cases, satisfactory analgesia for 3–4 hours, after which it may be repeated. It prolongs the first stage.

CAUDAL ANALGESIA.—Caudal analgesia with Anethaine or Nupercaine, 1 : 1,000 in normal saline, by the continuous drip method into the sacral canal is popular in America when the necessary supervision is obtainable. For method of inserting needle *see Nervous Diseases (Sciatica)*.

SPINAL ANAESTHESIA.—Spinal anaesthesia with Anethaine or heavy Nupercaine should be used more than it is, each of these drugs being effective for about four hours. Spinal anaesthesia must

not be given late in labour because of the fall in blood-pressure. Light Nupercaine is not suitable because of the difficulty in getting the patient to lie at the correct angle on her belly. (See Anaesthesia.)

PITUITRIN.—Pituitrin in labour can be of the greatest use during the second stage, when the anæsthetic weakens the pains or when a flabby multipara lacks the contractile strength to push the baby out. The membranes must have ruptured, and there must be no mechanical obstruction. Half a c.c. of a reliable Pituitrin or of Pitocin is injected intramuscularly, and will be followed within 10 minutes by strong contractions, often strong enough to produce the baby. Low forceps can often be avoided by this method. If the pituitrin is given fairly late in the second stage and care is taken to see that there is no mechanical obstruction, there is no risk of rupturing the uterus or of throwing it into tonic contraction. Pitocin can be repeated after an hour if necessary.

ECLAMPSIA

The treatment of eclampsia can be summed up in two words—prevent fits.

During pregnancy the urine should be examined and the patient's blood-pressure taken once a month from the end of the third to the end of the sixth month, once a fortnight to the end of the eighth month, and once a week during the ninth month. Should there be real albuminuria with a rise in blood-pressure, put the patient to bed on a glucose-limejuice-water diet and give her a mild saline purge every morning. After three days put her on a diet of fruit, sugar or glucose, tea with sugar, bread and butter or chupati with ghu, and green vegetables.

If matters have not improved at the end of ten days or if there are any warning signs of eclampsia such as headache, vomiting or visual disturbances like seeing flashes of light, induce labour. If the patient is very anxious to have a living child, and there is no actual deterioration in her condition, induction can be postponed until the thirty-fifth week of pregnancy. Artificial rupture of the membranes is usually followed by labour within 48 hours.

CHARACTER OF FIT.—The eclamptic fit resembles a typical epileptic fit, but with certain differences; the blood-pressure is raised, the urine contains a large amount of albumin, and the period of coma after the eclamptic fit is generally longer than after the epileptic, often being an hour or more.

TREATMENT OF A PATIENT HAVING FITS.—Treatment by purgatives and colonic lavage has now been abandoned at Queen Charlotte's Hospital because the disturbance caused by these procedures is liable to produce fits, the very thing one is trying to avoid. Every fit causes a deterioration in the patient's condition and it is by no means proved that the causative toxin is eliminated by purgation, but it is proved that the common cause of death is heart failure or cerebral hæmorrhage caused by a fit.

or sometimes by uraemia. The modern treatment, therefore, concentrates on rest, quiet, narcosis and diuresis. Of all the narcotics morphia is probably the best and it is used in conjunction with rectal chloral hydrate or paraldehyde, or with barbiturates given by the mouth, if possible, otherwise by injection.

The Queen Charlotte's Hospital routine is somewhat as follows:

- (a) Put the patient in a dark, quiet room, put cotton-wool in her ears and instruct the attendants not to speak above a whisper.
- (b) Give $\frac{1}{2}$ grain morphia by injection and a drachm of chloral hydrate in two ounces of water by the mouth or 6-8 drachms of paraldehyde in 8-10 ounces of water per rectum (the dose of rectal paraldehyde is one drachm for each stone of body-weight, and the solubility is one in ten of water).

Instead of the rectal analgesic, inject Gardenal Sodium one c.c. intramuscularly or give one grain of Gardenal by mouth every two to four hours until the fits are controlled.

If a fit occurs more than half an hour after the first dose of morphia and whatever else is given with it, repeat both immediately. When the patient begins to come round from the double narcotic, generally after about four hours, repeat them; the aim being to keep her sufficiently narcotized to prevent fits, but not to kill her.

If a patient is having fits she is not having enough drugs.

- (c) Give glucose water by the mouth; if this is done quietly with a feeding cup the patient is not disturbed.
- (d) Catheterize the patient, preferably about half an hour after a dose of morphia, once every twelve hours, and test the urine.
- (e) If the bowels have not acted after 24 hours, give a rectal saline washout.
- (f) During an actual fit, prevent the patient from biting her tongue by the usual method of putting something between her teeth, but do it gently.
- (g) Carry on the above treatment until the patient has not had a fit for 24 hours.
- (h) If labour has not started within 48 hours of the last fit, induce labour by rupturing the membranes.
- (i) Give plenty of chloroform and sedatives during labour and use forceps if necessary.

The above treatment, apart from being the best for the patient, has the very great advantage of being easy to remember and easy to carry out. It is hoped that after studying it the reader will never have that sinking feeling: "A case of eclampsia! What do I do and how can I do it?"

Indications for Caesarean section are a dying mother with a living child and obstructed or delayed labour with a living child. Post-partum eclampsia is treated on the same lines; the mortality is 27%, about double that of ante-partum eclampsia.

OCCIPITO-POSTERIOR POSITION

The leading symptom is undue delay in the second stage of a vertex presentation, in spite of good pains. Sometimes the membranes rupture early.

Abdominal examination shows a flat area above the pubes, which becomes cystic as the bladder fills. On auscultation the heart sounds are generally heard best in one or other flank, but sometimes the child's chest is applied to the mother's anterior abdominal wall (though not so close as in a face presentation) so the sounds are heard best in the middle line, a most deceptive state of affairs because it suggests an occipito-anterior position.

Vaginally, the striking thing is the ease with which the anterior fontanelle is felt, which means deficient flexion; now, as deficient flexion is the cause of an occipito-posterior position, whenever the anterior fontanelle presents, occipito-posterior should be thought of, the characteristics of the anterior fontanelle are that it is large, and can be easily dimpled by the examining finger, while four sutures meet at it instead of three; in an occipito-posterior presentation the examining finger can be run along the sagittal suture until the posterior fontanelle is felt behind. It is not, however, always as easy as this; for instance, one may be called to a patient who has been in labour for hours without progress, and there is so much *caput succedaneum* that neither sutures nor fontanelles can be identified with certainty. In this kind of case, before any other manoeuvre such as turning or forceps is tried, the patient is anaesthetized, and the surgeon's hand introduced through the cervix until one or both of the baby's ears can be felt; they, of course, point backwards.

MANAGEMENT.—

- (a) Before full dilatation allow the membranes to remain unruptured so as to dilate the cervix, unless the condition of the patient, as shown by undue fatigue or, especially, a rising pulse and temperature, calls for an early termination of labour.
- (b) After the membranes have ruptured, leave things alone in the hope that the child will flex its head and therefore turn, which it often does, especially after rupture of the membranes.
- (c) When the os is fully dilated or nearly so, the Queen Charlotte's practice is to allow about two hours for a primipara's and one hour for a multipara's baby to turn, and then to interfere. One reason is that as time goes on the caput gets bigger, so the chances of spontaneous rectification get less and less.
- (d) To turn the child, anaesthetize the mother, introduce the right hand into the uterus, push the child's head well up, and then twist it in the appropriate direction; meanwhile, with the left hand, push the anterior shoulder while the

assistant pushes the anterior buttock, in an endeavour to turn the child's body.

- (e) As soon as the head is occipito-anterior, apply forceps and deliver, otherwise it is liable to slip back. If the head is in the right position, the forceps lock easily, but not, as a rule, otherwise.

If, as sometimes happens, it is impossible to turn the baby, deliver with forceps as an occipito-posterior. An episiotomy saves a perineal tear, and the cervix *must* be examined for lacerations and sewn up if necessary.

BREECH PRESENTATION

Before labour has begun the treatment is external version, especially in primigravidae because of the high foetal mortality and the frequency of maternal lacerations.

Version is best performed at or after the 36th week, spontaneous rectification or recurrence often taking place earlier than that.

In cases of doubt, an X-ray picture must be taken, both before and after version; none of us are infallible, and in a muscular or fat woman, especially a primigravida, it may be very difficult on clinical examination to say for certain whether the presentation is a breech or not. This is particularly true of the foetus with extended legs because it settles low in the pelvis, so the heart beats may be heard best below the mother's umbilicus. Further, all cases of "failed version" should be X-rayed, because the cause of failure is often extended foetal legs. When a breech baby cannot be turned, and the patient is an elderly primigravida, *the treatment is Caesarean section*, which should also be considered in a similarly placed younger primigravida who is particularly anxious for a living child.

EXTERNAL VERSION.—External version is carried out as follows, no anaesthetic being required for the first attempt:

- (a) The patient's bladder and rectum should be empty.
- (b) Put the patient on the table in the semi-Trendelenburg position, or at any rate with the buttocks well raised, and powder her abdomen.
- (c) Confirm whether the back of the foetus is to the left or the right.
- (d) Gripping the lower pole of the foetus with the thumb and the fingers of the right hand (a sort of Pawlik's grip) push it well up out of the mother's pelvis.
- (e) With the left hand push the child's head forwards so as to flex the neck; at the same time push the buttocks in the opposite direction with the right hand.
- (f) If the child's buttocks are well free of the pelvis, they will be felt to move gently upwards, while the head moves gently downwards.
- (g) When the head is above the pelvic brim put the patient level, press the head well home and apply a firm binder.

The patient should be seen at intervals of a few days to see that the malpresentation has not recurred.

If the attempt fails, an anaesthetic should be given and another trial made. It may help if an assistant pushes the presenting part out of the pelvis *per vaginam*. The patient should be put in the full Trendelenburg position if necessary, the foetal heart and the patient's colour and respiration being carefully watched; anaesthesia should be deep enough to produce relaxation, Pentothal being very suitable.

When the case is first seen in labour, treatment depends upon the stage to which it has advanced.

To guard against possible complications, the following should be kept ready:

- (1) Knife, scissors, dissecting forceps, artery forceps and sutures in case episiotomy is required.
- (2) Forceps, in case they are required for the after-coming head (they seldom are, but they might just make the difference between life and death of the baby).
- (3) Carbon dioxide and lobeline in case the baby has to be resuscitated.

Before rupture of the membranes, if the pains are weak or there is good relaxation between pains, try external version as above. In any case, put the patient to bed and give her a sedative such as 3 grains of Amytal Sodium or Seconal. No other treatment is required, the object being to preserve the membranes so as to dilate the cervix.

MANAGEMENT OF A BREECH LABOUR.—

When the membranes have ruptured make a vaginal examination to discover:

- (a) Whether the cord has prolapsed and, if so, whether it is pulsating
- (b) Whether the feet are palpable; if not, the legs are extended, so extra watchfulness is required, but no immediate action is needed at present because most cases with extended legs deliver themselves.

There should be no interference until the child is born as far as the umbilicus, when:

- (a) A loop of cord is pulled down and its pulsations observed. So long as it pulsates there is no hurry.
- (b) The body of the child is wrapped in warm sterile towels.
- (c) The child's feet are brought out of the mother's vulva if they are not already out.

When the child is born as far as the axillae, pass a finger up in front of its chest and sweep the arms down across the chest, one at a time. If the arms are extended, the feet of the child should be raised and slightly drawn upon with one hand, and the other hand passed along the back of the foetus until the fingers reach the bend

of the elbow, which is firmly flexed and depressed; the child's forearm is now swept across its face and the hand delivered. The posterior arm is delivered first, and if there is any difficulty with the second arm, the baby is turned so as to make it posterior.

Delivery of the Head.—The occiput must be anterior, and the chin must be delivered before the occiput.

In a straightforward case, the simplest way to deliver the after-coming head is for the baby's body to hang over the edge of the bed, thereby flexing the neck and producing the necessary traction, assisted by pressure from above by a hand pressed on the mother's abdomen. As the head descends, the child's feet are taken in one hand and slowly raised, traction being maintained on them at the same time.

If there is any delay the "finger in mouth" procedure is the best, and is carried out as follows:

- (a) With the baby straddling the forearm, pass the middle finger of one hand (the writer uses the right, others prefer the left) well into the baby's mouth, and curl the index and ring fingers over the baby's shoulders.
- (b) Put the other hand on the mother's abdomen and firmly flex the baby's head.
- (c) Exerting suitable traction on the mouth and shoulders, and pressing on the mother's abdomen, extract the head, which is felt to roll round its transverse axis like a ball in a socket.

Alternatively, an intelligent assistant may press on the head while the operator passes his other hand along the baby's back and flexes the head by pressure on the occiput with his middle finger while the index and ring fingers pull on the shoulders.

Once the baby's mouth is free there is no need for hurry, and it is hurry that kills the baby by distorting the skull and causing intracranial haemorrhage.

As Green-Armytage points out, so long as the cord is pulsating in a breech delivery, the operator has at least five minutes at his disposal.

In desperate cases the forceps may be applied to the after-coming head; the body of the foetus is lifted high up and the forceps are applied from the ventral side of the foetus which, however, often dies.

TREATMENT OF A CASE WITH EXTENDED LEGS.—In multiparae most of these cases deliver themselves, but if the breech presents, and no progress is made for half an hour, interference is required, or the breech will become impacted. Watch the foetal heart.

- (a) Anaesthetize the patient.
- (b) Perform an episiotomy (this is harmless, gives more room, may prevent a bad tear and may allow the baby to be born without further interference or delay).
- (c) Watch the effect of two or three pains.
- (d) If the baby now progresses, let well alone, but if not, bring down the leg as follows:
- (e) Using the same hand as the side to which the baby's back

faces (left for left, right for right), push the presenting part up out of the pelvis, pass the hand along the child's abdomen until the anterior knee is felt; with a finger in the popliteal space press the leg backwards and outwards (in relation to the child). The knee now tends to flex and it may be possible to help by pressure from outside.

- (f) As soon as a foot is felt, catch it between two fingers and draw it gently down until it is presenting.
- (g) This is usually enough, but it may be necessary to draw the other foot down in a similar way.
- (h) When the baby is born, powder the episiotomy freely with penicillin or Cibazol powder and sew it up.

SHOULDER PRESENTATION

Anaesthetize the patient fully, push the presenting part upwards, catch hold of the baby's feet, draw them gently down, and deliver as a breech.

UTERINE INERTIA

This is divided into primary and secondary; the first comes on early in labour, and might more graphically be called "laziness", so the treatment is stimulation (small doses of Pituitrin or acetylcholine).

Secondary inertia comes on after labour has been in progress some time, and might better be called "fatigue", so the treatment is rest (morphia, barbiturates, or chloral and bromides).

FORCEPS

"The difficulty in forceps is not the actual application or delivery, but the correct time for their application" (Solomons.)

As already indicated, low forceps can often be avoided by a timely injection of Pituitrin, or, if there is danger of perineal rupture, by episiotomy.

There are many different kinds of forceps; the writer prefers Neville's axis-traction forceps because of their simplicity, and because he is familiar with them.

Axis-traction forceps are used for "high" (head at the brim) and "middle" (head in the pelvis) forceps, but "low forceps" (head on the perineum) can be of any type, generally the small, short-handled type, which the inventor used to produce from his pocket more than three hundred years ago.

The common indications for application of forceps are:

- (a) *Signs of foetal distress.*—Pulse less than 120 or more than 160. Passage of meconium in vertex presentation (this indicates that the foetus is or has been in distress). Convulsive movements (these indicate that foetal death is imminent so great speed is needed; a quick episiotomy while the forceps are being applied makes rapid delivery safe if the cervix is fully dilated).
- (b) *Maternal Causes.*—By far the commonest cause is delay in the second stage, whether due to ineffective uterine

contractions (inertia), to slight disproportion, or to persistent occipito-posterior position.

Three essentials must be present before forceps are applied :

- (1) The membranes must be ruptured.
- (2) The os must be fully dilated, or the cervix will be torn.
- (3) The uterus must be capable of contracting, or there will be post-partum hæmorrhage.

APPLICATION OF FORCEPS.—

- (a) Anaesthetize the patient.
- (b) Put her in the lithotomy position.
- (c) Well lubricate the gloved hand and the forceps.
- (d) Introduce the left hand between the cervix and the child's head, on the right-hand side of the mother.
- (e) Insert the anterior blade of the forceps between your hand and the baby's head, making perfectly certain that the hand and blade are *inside* the cervix.
- (f) Insert the posterior blade similarly on the mother's left side, with the right hand inside the cervix.
- (g) Lock the blades by applying the axis-traction handle.
- (h) Confirm that both blades are inside the cervix and are gripping the baby's head, *not* the mother's cervix (this may seem ridiculous but the writer has seen this precaution avert disaster; things are not so easy at the bedside as they sound in books).
- (i) Exert firm but controlled traction, preferably during each pain, but in any case imitating nature by pulling intermittently.
- (j) Be careful not to cause a tear with the shanks of the forceps, which must always be lubricated and carefully controlled.
- (k) As the vulva dilates, gently loosen the blades, which in many cases can be removed at this stage, thereby lessening the risk of a perineal tear, the next pain producing the baby. If there is likelihood of a tear, do an episiotomy first (some gynaecologists do this in every case, but gentleness and dexterity are often a better substitute).
- (l) Carefully examine the vagina and the cervix for lacerations and stitch them up if present.

CONTRA-INDICATIONS.—Forceps must not be applied:

- (a) If the head is floating above the brim.
- (b) If the cervix is *not* fully dilated.
- (c) If there is obvious disproportion or a brow presentation.
- (d) If secondary uterine inertia (i.e., uterine fatigue) is of such a degree that there are no pains.

It is almost needless to repeat that the membranes must have ruptured before forceps are applied.

CAESAREAN SECTION

At the present time the *only* method widely used in Caesarean section is the trans-peritoneal route, but by this approach the

uterus may be opened either in the upper segment, or in the lower segment.

In the classical operation, a vertical incision is made in the upper segment, and little has been added to the technique of the operation in recent years. Attention has been paid mainly to the suture of the uterine wound, and many different methods of performing this part of the operation have been advocated, but some of these are unnecessarily complicated; good results are obtained by simple interrupted catgut sutures through the whole thickness of the uterine wall, followed by a continuous Lembert suture through the peritoneal coat to bury the first line of stitches. The modern technique of such an operation is to be found in most text-books. The causes of rupture of the scar have been investigated, with the result that sepsis and ineffective suturing are now regarded as the most important factors in the predisposition to this accident.

In America and the Continent of Europe the lower segment operation has been in favour for a number of years, and recently in England it has become more popular. The abdomen is opened by a sub-umbilical incision, the bladder is dissected off the uterus, the upper peritoneal cavity is packed off by gauze, and the lower uterine segment is then incised either vertically or horizontally. The foetus is then delivered through this incision, either by the obstetric forceps or by pressure from above, the delivery of the placenta follows, and the incision is then closed in layers. The details of the operation vary with different operators, but the principle of confining the manipulations, and the escape of liquor amni, to the lower part of the peritoneal cavity, is the same in all cases.

The advantages of this operation over the classical Caesarean section are:

- (a) The wound is in a part of the uterus that is not continually contracting and relaxing, and is, therefore, more likely to heal firmly.
- (b) The greater part of the peritoneal cavity can be effectively packed off from the operation area, and is therefore less likely to become infected from the escape of liquor amni, etc., in cases which are not absolutely sterile.
- (c) The wound is closed in layers, the incisions in which do not directly overlie one another.
- (d) A small transverse suture line in the utero-vesical fold is the only wound on the visceral peritoneum, and is much less likely to become adherent to other abdominal viscera than is the suture line in the classical operation.
- (e) Owing to the fact that the escape of liquor amni and blood into the general peritoneal cavity is under control, there is a minimum of abdominal distension and discomfort after the lower segment operation. The main objections to the operation are that it takes much longer to deliver the foetus, and that it is certainly a more difficult operation than the classical one.

especially if the lower segment has not been well developed by labour pains; and it has yet to be shown conclusively that the lower-segment scar is more secure than one in the upper segment. There is no doubt, however, that where Caesarean section is indicated, and at the same time there is a possibility of infection of the interior of the uterus, it is by far the less dangerous operation, and it is in such cases that its use is likely to become universal.

In extreme cases of contracted pelvis, in cases of severe anaemia requiring Caesarean section for some other reason and in cases of central placenta praevia, the best operation is fundal Caesarean section. An antero-posterior incision is made through the fundus exactly in the middle line, half the incision being in front and half behind. As this is the "bloodless" area of the uterus, haemorrhage is minimal and, in the case of placenta praevia, the incision is well above it. It is generally necessary to eventrate the uterus before incising it.

The advent of chemotherapy produced quite a boom in Caesarean section, which is now performed in many cases when it would have been considered criminal a few years ago, particularly in minor degrees of pelvic contraction; in such cases both the patient and her medical attendant justifiably prefer a short operation producing a live baby to a long and tedious labour with perhaps nothing to show for it but a dead baby and a lacerated perineum.

ABSOLUTE INDICATIONS.—

- (a) True conjugate less than 3 inches; transverse less than 4 inches. In India the accepted irreducible minimum is slightly less, but the above is a good safe guide.
- (b) Obstruction by tumours, atresia, etc.

RELATIVE INDICATIONS.—If it is thought that there is some degree of contraction in a primigravida, far the best thing is to have two good X-ray pictures taken as described above under Pelvimetry; the pictures also show the relative size of the child's head and the mother's pelvis, together with its position and attitude. The question of Caesarean section or induction is then easier to decide, but knowledge of certain other facts may help:

- (a) A child is unlikely to survive if born by induction or otherwise before the 35th week.
- (b) The poorer the patient the less likely is a premature infant to survive.
- (c) The death rate among all premature infants is considerably higher than among those born at term.
- (d) A small round (generally contracted) pelvis is more dangerous than a flat one, and a funnel-shaped one may be more dangerous than either.
- (e) Caesarean section, like any other abdominal operation, must be performed in proper surroundings. The only exception is sudden death of a woman at term, whom the baby survives

by 10 minutes. In this case the operation may be done with a carving knife if there is nothing else.

The other common relative indications before labour has begun are, an elderly primipara, placenta praevia, after colporrhaphy for severe laceration, malpresentations which cannot be rectified, e.g., a breech with extended legs in an elderly primipara, any breech when the life of the child is very important, doubtful tumours, previous Caesarean section and cases in which it is desired to sterilize the mother, e.g., in tubercle or heart disease.

After labour has begun, Caesarean section must be considered in prolapse of the cord (where it may be the only way of saving the child's life), in intractable uterine inertia and its opposite, tonic contraction, in cases of rigid cervix, malpresentation, ante-partum haemorrhage and, again, placenta praevia.

Anaesthesia must not begin until the surgeon is "scrubbed-up" because premedication or much anaesthetic will cause asphyxia of the baby.

Three Caesarean sections on the same patient are usually considered the safe limit, but there is alleged to have been a hardy Parsi lady in Bombay whose husband performed the operation on her seven times before sterilizing her.

CONDUCT OF THE THIRD STAGE OF LABOUR

Provided that a careful watch is kept on the pulse there is a growing tendency not even to put a hand on the fundus, still less to "rub it up" until at least half an hour has elapsed since the birth of the child. The reason is that artificial stimulation of the uterus prevents the proper formation of the retro-placental clot, which normally begins about the middle of the placental site, from which it spreads out, turning the placenta and membranes inside out and thereby ensuring their complete separation. This process takes between 20 and 30 minutes and occurs in about 80% of cases (Solomons). When the placenta is in the vagina, gentle pressure on the fundus will push it out.

If it has not come down at the end of half an hour (*not* 20 minutes as used to be taught), massage the fundus and make gentle efforts at squeezing the uterus on the lines detailed in Post-partum Haemorrhage.

POST-PARTUM HAEMORRHAGE

Except in the fulminating case described later, when there is no time for questions, the surgeon must find out four things:

- (1) Is the uterus empty?
- (2) Is it retracting?
- (3) Is there a laceration?
- (4) Is the bladder empty?

If the placenta has not come away it must be removed by external pressure or manually, the former being tried first. The writer prefers the following method because he is perfectly certain that a common cause of prolapse is injudicious expression of the placenta in which

the uterus is forced downwards so that the cervix even appears at the vulva and the cardinal ligaments are stretched beyond repair:

- (a) Pressing backwards and downwards in the region of the patient's umbilicus, get the fingers of the left hand behind the fundus uteri and antevert it to the fullest extent, even get it over the pubes if possible.
- (b) Compress the body of the uterus between the thumbs and fingers of the two hands, from before backwards and from side to side, the aim being to squeeze out the placenta as juice is squeezed out of half an orange.

Traction on the cord, although condemned by most teachers owing to fear of its causing inversion of the uterus, is quite helpful if the fundus is carefully controlled and observed, and the pull on the cord is judicious and not violent.

If per abdominal expression is not successful, manual removal must be done; it is carried out as follows.

- (a) Anaesthetize the patient.
- (b) With the left hand holding the fundus, make the well-lubricated fingers of the gloved right hand into a cone and, following the umbilical cord, insert them into the uterus right up to the fundus.
- (c) Search round for the edge of the placenta, insinuate the fingers gently between it and the uterus and peel off the placenta. If the edge cannot be found, instruct the nurse or assistant to pull gently on the cord, and scratch through the membranes and placenta to the space between it and the uterus; but do not scratch through the uterus, which is very soft. (If there is a contraction ring, Green-Armytage advises inhalation of amyl nitrite.)

If the uterus is empty but not retracting, give full doses of an injectable ergot preparation and Pituitrin, and massage and compress the uterus per abdomen. If this is unsuccessful, give a hot (120° F.) intra-uterine douche.

If haemorrhage still continues, pack the uterus with Cibazol-glycerin gauze, as follows:

- (a) Anaesthetize the patient.
- (b) Put her in the lithotomy position, insert a speculum, grip the anterior and posterior lips of the cervix with ring forceps and, using a pair of long non-toothed forceps, pack the uterus from fundus to os. The opportunity is also taken to look for, and, if necessary to repair, tears in the cervix or vagina.

If the blood comes in a steady trickle, and particularly if it is bright, a laceration is probable, so expose the cervix as above, and carefully sew up any laceration or lacerations with interrupted chromic catgut sutures, being careful to begin at the very top of the tear.

If the bladder is full, or even may be full, pass a catheter.

THE FULMINATING CASE.—In this, happily, rare emergency,

the surgeon must act before he thinks, and the first action is to compress the patient's abdominal aorta with his left fist; he then thrusts his right fist (washed with Dettol by the assistant if not already gloved and clean) into the patient's vagina, and presses up the cervix and anterior wall of the uterus, while with his left (abdominal) hand he anteverts the uterus, which he now compresses between his two hands.

If the uterus is empty a full dose of an ergot preparation and one c.c. of Pituitrin are injected, while preparations are made for giving a hot intra-uterine douche (120° F.), and an intravenous glucose-saline or, preferably, a blood transfusion. As soon as the hot douche is ready it is given, and if the hæmorrhage does not cease the uterus should be packed with Cibazol-glycerin gauze or iodoform gauze soaked in glycerin as described above.

If the uterus is not empty the intra-vaginal right hand removes the placenta or any remains or clots, after which ergot or Pituitrin injections are given, and the bleeding generally stops; otherwise proceed as above.

ASPHYXIA NEONATORUM

This is divided into "blue" or "livid", and "white". In blue asphyxia the cord is pulsating strongly, in white asphyxia it is not.

Blue asphyxia is caused by obstruction or by narcosis of the mother, so the treatment is to remove the obstruction by suction with a mucus extractor, to give CO₂ and oxygen, and gentle artificial respiration. Mouth-to-mouth respiration is an old-fashioned and excellent method which has saved many young lives. Rubbing brandy on the lips and slapping the inverted child with cold water will often make it cry. An injection of lobeline (gr. $\frac{1}{8}$) into the umbilical vein is one of the best respiratory stimulants known.

(N.B.—If a baby is born asphyxiated, cut the cord long so as to facilitate intravenous injection.)

White asphyxia is a much more serious condition and is due to shock. The old treatment of slapping and squeezing is the worst possible. Instead:

- (a) Apply the mucus catheter in case there is some obstruction.
- (b) Inject lobeline into the umbilical vein.
- (c) Lay the child on its side, with its head low, and give oxygen and CO₂, with gentle artificial respiration, or do mouth-to-mouth respiration.
- (d) Keep the child warm.
- (e) If the heart is very feeble or seems to have stopped, inject $\frac{1}{2}$ c.c. of adrenaline into it through the third or fourth left interspace.

OPHTHALMIA NEONATORUM, PREVENTION

- (a) Wipe the eyes with a clean boric swab as soon as the head is born.
- (b) Drop two or three drops of Collosol Argentum Ophthalmic (Crookes) into each eye.

- (c) Repeat the Collosol Argentum when the child has its bath, and daily for the first five days of its life.

In experiments with many hundreds of cases the writer found that this method gave the most consistently good results.

Other methods are to instil two drops of 2% silver nitrate solution at birth; or to use 5% Protargol or Argyrol or penicillin 3,000 units per c.c.

For the treatment of ophthalmia neonatorum see Eye.

PUERPERAL SEPSIS

One of the greatest triumphs of chemotherapy is in the treatment and prevention of puerperal sepsis.

- (a) If there is any laceration, apply Cihazol or a similar powder before sewing up.
- (b) If there is any chance of infection, or if there have been any intra-uterine manipulations, give one of the sulpha drugs for the first five days after delivery.
- (c) If signs of puerperal infection develop, give vigorous chemotherapy.

Local measures still have their uses, and if the lochia are unhealthy, a Milton or eusol vaginal douche will greatly improve matters. Intra-uterine glycerin is seldom necessary in the presence of chemotherapy, but may occasionally be of service. Intra-uterine penicillin, 5,000 units per c.c. of sterile distilled water, has also been used with success.

PREVENTION.—The fact that it is now easier to cure puerperal sepsis is no reason for relaxing precautions, of which the chief are:

- (a) All attendants at a labour must wear masks, and anyone with a throat or other infection must be excluded.
- (b) Rigid aseptic ritual for surgeon or midwife, including sterile gowns and gloves.
- (c) Minimum of interference and examinations compatible with a knowledge of what is going on, but if a vaginal examination seems likely to give valuable information it should always be performed, under suitable aseptic conditions.

LACTATION

TO INCREASE THE FLOW.—The lactogenic hormone prolactin is the best treatment. The hormone is sold as Physolactin (Glaxo), and is given intramuscularly every day for five days, the dose being 5 c.c., 5 c.c., 2 c.c., 2 c.c., 1 c.c.; the effect is apparent in 24–36 hours and the hormone may be used at any time within the first six weeks of lactation.

Other measures are the drinking of plenty of fluids, and the eating of plenty of food, especially green vegetables (consider the cow, which makes milk from grass and water). A further important point is the avoidance of worry, insomnia and emotional upsets, not always easy at this time when primitive woman becomes like a tigress with her cubs.

Cotton-seed oil has a great reputation as a galactagogue in cattle and is often useful in women; Lactagol is the standard preparation, the dose being a teaspoonful four or five times a day in milk. Edestine is said to be the active principle.

Large quantities of milk should not be forced on the patient, although a cupful of cocoa, Ovaltine, Bournvita or Horlicks may usefully be given in the middle of the morning and last thing at night.

TO STOP THE FLOW.—An injection of oestrogen (Oestroform, Ovocylin, etc.), 50,000 units every other day, supplemented by twice-daily doses of 0.3 mg. dienoestrol or 1.0 mg. stilboestrol will stop the flow of milk in a few days. Alternatively, male hormone, e.g., Peraodren, 25 mg., may be given daily.

If hormones are unobtainable, the old treatment of belladonna plaster to the breasts and mag. sulph. by the mouth may be given. If the breasts become painful, withdraw only enough milk to relieve the pain.

OEDEMA OF THE LUNG—See Heart Disease.

OLD AGE

The phenomena of old age are associated with a gradual diminution in the activity of the endocrine glands—not one gland in particular, but the whole ductless glandular system. Reaction is diminished and pain is not felt so acutely; there may be considerable fever without any rise of the thermometer in the mouth, and constipation is very frequent.

The aged require little food; they are usually grossly overfed; their diet should consist of vitamin-containing foods, such as butter, milk, cream, and eggs, with tomatoes, spinach and fresh fruit; abundance of fresh air, with physical and mental exercise, is necessary.

OPHTHALMIA—See Eye.

ORAL SEPSIS—See Dental Surgery.

ORCHITIS (See also Epididymo-orchitis.)

This is generally associated with epididymitis and is of several kinds

Traumatic, following a kick or similar injury. There is much pain and a hæmatoma is present. If this is large it should be washed out, under local anaesthesia, with normal saline through a cannula.

After a penetrating wound septic infection may, of course, occur.

After Mumps, usually within 10 days, a severe epididymo-orchitis may occur, which may be bilateral; if so it is likely to be followed by sterility.

Treatment is by rest and local application of lead lotion.

Infective, due to *Bacillus coli*, streptococci, etc. Hamilton Bailey mentions Acute Epidemic Funiculitis, which occurs in Egypt and India. It is probably an acute streptococcal thrombophlebitis of the

vessels of the spermatic cord, and is accompanied by acute hydrocele. Several fatal cases have occurred.

TREATMENT.—This is by vigorous chemotherapy.

Syphilis in the tertiary stage attacks the testicle, causing a gummatous orchitis; clinically, an important sign is the absence of testicular sensation on pressure.

Tuberculous Orchitis follows tuberculous epididymitis.

ORIENTAL SORE—See Leishmaniasis.

OSTEOARTHRITIS—See Arthritis.

OSTEOMALACIA—See Rickets.

OSTEOMYELITIS—See Bone Inflammation.

OTITIS—See Ear, Diseases of.

OTOSCLEROSIS—See Ear, Diseases of.

OXALURIA

The causes of an increase of calcium oxalate in the urine are not known. As regards diet, measures should be taken to exclude excess of both calcium and oxalic acid by forbidding milk, rhubarb, eggs, tea, figs, beetroot, spinach and tomatoes, and giving fish, meat, rice, bread and other farinaceous foods. Mag. sulph. gr. 30 daily is advisable as the magnesium salt is more soluble than the calcium. Exercise and a digestive mixture with nitro-hydrochloric acid is also useful.

OXYGEN

It is only recently that the value of oxygen in therapeutics has been fully appreciated, and probably in future it will prove of great value in the treatment of a number of diseases of the circulatory and respiratory systems.

In the past too little has been given, and considerable quantities must be used to be effective. A patient with fever breathes about 10 litres of air per minute and this contains two litres of oxygen; two extra litres per minute are required; oxygen bubbling through a Wolff's bottle only does so at the rate of about 0.2 litre per minute. It has been shown in cases of pneumonia that the arterial blood has at times only 80% saturation, which means that the oxygen tension is only 50 mm. Hg instead of the normal 100 mm. Hg. If these two litres of oxygen per minute are given, the degree of saturation can be increased to 91% or an oxygen tension of 70 mm. Hg, and this is accompanied by marked improvement in the patient's condition.

The action, however, of oxygen in pneumonia is irregular, as in some cases large patches of consolidation are cut off from all possibility of absorbing oxygen, and the blood leaving this part of the lung must be imperfectly oxygenated.

An important point in treatment with oxygen is that it must be

begun early, before marked signs of cyanosis appear, as once well-marked cyanosis is established it rapidly produces injury to the tissues and especially the heart muscle; it is therefore all-important to prevent cyanosis from appearing. As regards administration the funnel is wasteful and inefficient; few patients can tolerate a mask; the best method is by a soft catheter passed in 2 to 3 inches into the nose; any irritation is allayed by smearing it with cocaine ointment and the catheter is fastened to the cheek by strapping. Oxygen as it issues from the cylinder is cold and dry, and it is therefore advisable to pass it through a coil in hot water.

OZAENA—See Nose, Diseases of *and* Hormones.

PALMAR ABSCESS—See Hand and Finger Infections.

PALPITATION—See Heart Disease.

PANNUS—See Eye.

PARALYSIS AGITANS

Patients should be encouraged to continue their normal work and pleasures as long as possible; the disease cannot be cured and is slowly progressive; drugs have little influence over the tremors, but those of the hyoscine, belladonna, stramonium group relieve the rigidity, thus giving more freedom, and diminish the excessive salivation. Hyoscine hydrobromide commencing at $\frac{1}{100}$ gr. t.d.s. and gradually increasing up to $\frac{1}{2}$ gr. or even $\frac{1}{8}$ gr. or Tr Belladonna from 15–40 m. t.d.s., or Genoscopolamine $\frac{1}{8}$ to $\frac{1}{4}$ gr. daily may be given. In all cases a watch must be kept for the appearance of any toxic symptoms, the first being difficulty in reading from loss of accommodation for near vision, and then dilatation of the pupils.

PARAPHIMOSIS

Except in early cases it is better to give an anaesthetic in order to effect reduction.

- (a) If crushed ice is available, bandage some round the penis.
- (b) Using plenty of oil, try with the thumb and first two fingers of the right hand to press the glans through the constricting ring, which is held in the fingers of the left hand.
- (c) If this fails, take a pair of toothed dissecting forceps, and on the dorsal aspect of the penis grip the constricting ring. It is then usually an easy matter to effect reduction by a combination of gentle traction on the forceps, and digital pressure on the glans. This method generally makes incision of the band unnecessary, but this must be done if no other method succeeds.
- (d) Circumcise the patient after a week or two.

PARATYPHOID—See Enteric Fever.

PARKINSONISM—See Paralysis Agitans and Encephalitis Lethargica.

PARONYCHIA—See Hand and Finger Infections.

PAROTITIS—See Mumps.

PAROXYSMAL TACHYCARDIA—See Heart Disease.

PEDICULOSIS CAPITIS

Wash the head with a mixture of xylol and ether, equal parts or apply Ung. Hydrarg. Ammoniata containing a drachm of xylol to the ounce. The dead nits are later combed out with a fine comb and the head washed with soap and water. Nits may also be removed with acid (Acid. Acetic Dil.). The classical method is to apply the ointment to protect the skin and then to swab the hair with third-grade kerosene, after which some rags are soaked in it and the whole covered with a cap for 24 hours. One in forty carbolic acid lotion may be used instead. Washing the hair with petrol is also satisfactory, but this is *most dangerous in a dry climate*, where the friction of the hair may cause a spark, with terrible results.

D.D.T. in a strength of 1% in alcohol or kerosene, rubbed into the hair, not only kills all pediculi but protects the individual against them for about a fortnight if he does not wash his hair, but when there is no danger of re-infestation the hair can be washed and combed after about an hour. Gammexane in 0.25% dilution has a similar effect.

PEDICULOSIS CORPORIS

This condition is best treated by the D.D.T. (1%) spray; the clothes must also be sprayed, especially at the seams, or powdered with D.D.T. 10% in an inactive base such as talc powder or French chalk or with Gammexane dust "DO34", otherwise Unguentum Hydrarg. Ammoniata should be applied to the skin, after a bath, and the clothes sterilized by heat or steam.

PEDICULOSIS PUBIS

This condition is rapidly cured by 1% D.D.T., by Unguentum Hydrarg. or by Ung. Hydrarg. Ammoniata. It is not necessary to shave the pubes.

PELLAGRA

The early symptoms of this deficiency disease are a *sore tongue* and loss of appetite, with loss of weight and sometimes *dermatitis* and mental depression.

The typical skin lesion appears on the backs of the hands and on the face (often thought at first to be sunburn), and is *worse in the spring*. Later, the skin becomes dry, pigmented, and cracked. Mental changes include melancholia, and *serious symptoms* resemble those of subacute combined degeneration of the cord (q.v.).

TREATMENT.—Give nicotinic acid in *full doses*, up to 2

gramme a day for 10 days and then reduce. Give also riboflavin (vitamin B₂) and the rest of the vitamin B complex. Liver, eggs, Marmite and yeast should be included in the diet.

PEMIPHIGUS

This is rare in adults and treatment is by chemotherapy with local pricking of blisters. Carbarsone has been useful in some cases.

PEMIPHIGUS NEONATORUM

This is of two kinds—septic and syphilitic; the latter affects the feet and hands chiefly, and there are other signs of congenital syphilis.

Septic pemphigus neonatorum is probably the infantile equivalent of impetigo contagiosa, and affects feeble infants. It may begin as early as the first week.

TREATMENT.—This is by chemotherapy and isolation. Weak antiseptic baths are also recommended, such as potassium permanganate 1:4,000.

PERICARDITIS—See Heart Disease.

PERIOSTITIS—See Bone Inflammation.

PERIPHERAL NEURITIS—See Nervous System.

PERITONITIS—GENERAL

By far the most important physical sign is rigidity of the abdominal wall. It is accompanied by tenderness and in the later stages by distension. The pulse is rapid and the temperature rises after the first few hours.

The commonest cause is a perforated viscus, usually the appendix, sometimes the duodenum or stomach, occasionally the bladder, or in typhoid fever the terminal part of the ileum. Pneumococcal peritonitis is not uncommon in children (generally accompanied by herpes of the lower lip), and gonococcal peritonitis may occur as an extension from the Fallopian tubes.

A ruptured spleen, liver, ovarian cyst or ectopic gestation irritates the peritoneum and causes all the symptoms of general peritonitis, but the rigidity is not quite so marked, and there may be shifting dullness and symptoms of internal haemorrhage as well.

TREATMENT.—If the cause is a perforated viscus and the condition of the patient permits, the abdomen should be opened at once. If the appendix is at fault and can be removed without undue difficulty this should be done, and a perforation of the duodenum, stomach or ileum must be sewn up; a purse-string stitch usually suffices, but if the viscus is very oedematous it may be better to infold the perforation and sew up transversely. When there is any doubt about the water-tightness of the repair the omentum should be attached with a few interrupted stitches. In these cases the area must be freely powdered with a sulphonamide,

and drained by means of a soft rubber glove drain, through a separate stab wound.

When in doubt about the cause, make a right subumbilical paramedian incision; this can be extended upwards or downwards at will.

Spinal anaesthesia is the best because of the relaxation it gives, but there may be some headache afterwards, if the patient is in the Fowler position.

Active chemotherapy is carried out at the same time, and after the operation the patient is put in the Fowler position and given nothing but water by the mouth for 48 hours; transfusion with blood-plasma or saline may be required.

PERITONITIS—TUBERCULOUS

The commonest lump in a man's belly is tuberculous glands; in a woman's, a baby.

The commonest cause of symptomless fever lasting for weeks or months is tuberculous peritonitis.

There are three varieties—wet, dry and caseating; in all, the glands are enlarged but in the last-mentioned they are breaking down.

The commonest physical sign is a doughy distension with slight rigidity. If fluid is present, there will be shifting dullness unless the fluid is loculated.

TREATMENT.—In all cases general treatment is essential; it includes fresh air, rest in bed, vitamins and calcium injections, and the diet should be "light but nourishing". The temperature and pulse are taken morning and evening, and the patient is not allowed out of bed until they remain below 100.

In a case which came under the writer's notice in Rajputana, a young man had such masses of glands in the abdomen that sarcoma seemed the probable diagnosis, but the patient was put on injections of Solganol B Oleosum and in three weeks not a gland was to be felt. This or a similar drug is, therefore, always worth trying in these cases.

When fluid is present a small midline subumbilical incision should be made under local anaesthesia, the fluid let out, the air let in, and the abdomen closed. This is better than tapping or oxygen inflation because it both gives better results and is less dangerous, as gut may be adherent to the parietal peritoneum and be punctured. If the little operation is refused, and tapping is to be done, never tap a resonant area.

Even in cases of dry peritonitis a laparotomy is sometimes beneficial, but general treatment is more important.

In the absence of tuberculous lesions elsewhere, the prognosis of tuberculous peritonitis is good, although in later years obstructive adhesions may form. (*N.B.*—The less these adhesions are interfered with the better.)

PERITONSILLAR ABSCESS—See Tonsillitis.

PERNICIOUS ANAEMIA—*See Anaemia.*

PERSPIRATION, EXCESSIVE AND OFFENSIVE

X-rays applied to the affected area by an expert are curative in most cases, ten or twelve applications usually being required.

Local applications are sulphate of aluminium 2% in water, or tannic acid 1% in equal parts of water and spirit. Dusting powders containing 3% of salicylic acid are also useful.

Moist, clammy bands can often be improved by rubbing them with 10% formaldehyde solution or by X-ray irradiation.

Patients suffering from sweating feet (bromidrosis) should wear chaplis or sandals in preference to boots or shoes, should change their socks or stockings daily or wear none at all, and wash their feet in 1% formalin or 1:4,000 potassium permanganate.

PERTUSSIS—*See Whooping Cough.*

PESSARIES, SIZES—*See Dressings and Accessories.*

PHARYNGITIS—*See Tonsillitis.*

PHIMOSIS—*See Circumcision.*

PHLEBITIS

This is accompanied by intravenous clotting, the thrombus being either non-suppurative as in "white leg" or suppurative as in lateral sinus or cavernous sinus thrombosis. Obviously the treatment of the two conditions is quite different.

NON-SUPPURATIVE THROMBOSIS.—In non-suppurative thrombosis the object is to prevent the clot from spreading, moving or breaking off. The first is achieved by rest and elevation and by heparin and dicoumarin, if available (for details, see Coronary Thrombosis in the section, Heart Disease); the time-honoured application of equal parts of glycerin and Ichthyol on lint is also good, one advantage is its messiness, which keeps the patient still, so avoiding soiling all the bed-clothes.

The second and third objects are achieved by complete rest, a light splint to the back of the leg being advisable. Ligation of the vein between the clot and the heart is sometimes carried out, especially if there is a previous history of pulmonary embolism. These patients are generally kept in bed for about six weeks, but as the clot is adherent to the vessel wall at the end of 14 days, three weeks would appear to be a safe period.

PREVENTION.—Post-operative and post-partum thrombosis can be prevented by avoidance of venous stasis; in other words, as soon as the patient recovers from the anaesthetic she is encouraged to move her legs and to turn over on one side. The "donkey" pillow behind the knees should be strictly forbidden. Since adopting this routine the writer has not seen a case of femoral thrombosis in a

long series of childbirths and abdominal operations. Curiously enough, the new custom of getting patients out of bed the day after operation has in some series of cases been followed by a larger incidence of post-operative venous thrombosis.

SUPPURATIVE THROMBOPHLEBITIS.—The only forms of treatment of any avail in this condition are large doses of penicillin and proximal ligature where anatomically possible—e.g., the internal jugular vein should be tied when there is lateral sinus thrombosis from middle-ear suppuration, and the angular vein may be tied for carbuncle of the upper lip.

In suppurative pyelo-phlebitis the causative appendix may perhaps be drained.

PHOTOTHERAPY

The therapeutic value of artificial light apparently depends chiefly upon the wavelength of the rays.

Artificial light used for treatment may be grouped under two heads: (1) Rays that emit heat and visible rays only, (2) Ultra-violet rays.

(1) HEAT AND VISIBLE RAYS.—The sources of these rays are the Leucodescent lamp and the Dowsing incandescient lamp; the former is a high-power incandescent electric light of 300–500 candle power; the effects are those of heat alone. The lamp is mounted on a bracket and moved up and down, after being focused on the skin at a distance of about two feet, for a period of about ten to fifteen minutes; the treatment can be repeated daily. The Dowsing incandescent lamp is less powerful than the above, but small, portable and easily manipulated and is therefore useful in treating small areas, such as individual joints. The following affections can be treated by these rays: neuralgia—the pain of this condition may be greatly alleviated—fibrositis, arthritis, muscular rheumatism, and local inflammatory conditions due to pyogenic organisms, such as furunculosis and abscesses. The rays relieve the pain and bring them to a head rapidly for opening.

(2) ULTRA-VIOLET RAYS.—Ultra-violet rays have a potent action in killing micro-organisms, but have little power of penetration; they produce pigmentation and erythema of the skin; but apart from this bactericidal power they have a general effect on metabolism and raise the bactericidal power of the blood, and cause lymphocytosis. Ergosterol, normally present in the skin, under the influence of ultra-violet rays produces vitamin D which is specific for the growth of bone and healing of wounds. The following sources of artificial light are used in ultra-violet treatment: (1) The Mercury vapour lamp, (2) The Kromayer lamp, (3) The Carbon arc, (4) The Tungsten arc. The Mercury vapour lamp is relatively poor in heat waves but is rich in ultra-violet rays. In treatment the coldness of the light is compensated for by a circle of incandescent electric lights grouped round the Mercury lamp; this constitutes artificial heliotherapy. Treatment should be commenced with an

exposure of one minute with the lamp at a distance of three feet; this may be gradually increased up to an exposure of fifteen minutes three times a week, but it is advisable before commencing treatment to test the sensitivity of the patient by local application to a small area of the skin of the forearm through a hole in a protective covering. The Kromayer lamp is a water-cooled lamp with a quartz window and is most effective for local application. The Carbon arc has the advantage that the biological action of the ultra-violet rays is increased by the presence of heat and visible rays, being thus more like the natural rays of the sun. For treatment the patients, in a nude condition, sit around the lamp at distances of three feet or more, the eyes being protected by dark glasses. Exposure commences with about fifteen minutes and increases up to two hours or more per day; pigmentation of the skin is rapidly produced. The Tungsten arc has been largely replaced by the Mercury vapour lamp, as it has the disadvantages of the expense of the Tungsten poles, spluttering an emission of sparks, and is only applicable to limited areas.

DISEASES BENEFITED BY LIGHT TREATMENT:

RICKETS.—When sunshine is not available, exposure to the Carbon arc is unquestionably very effective; it not only improves the general health and standard of nutrition, but also increases the rate of growth; it has also been used for the ante-natal treatment of expectant mothers in localities in which rickets is prevalent.

SURGICAL TUBERCULOSIS AND LUPUS.—It is of great service in these conditions in the absence of natural heliotherapy, and should be administered by either the Carbon arc or the Mercury lamp under conditions approximating those of the open air as nearly as possible.

PULMONARY TUBERCULOSIS.—Great care and judgment is required in these cases; it should not be used when there is any pyrexia, but chronic and healed cases frequently benefit.

FIBROSITIS AND MUSCULAR RHEUMATISM.—Pain is relieved in these cases and the absorption of fibrositic indurations is promoted.

SKIN DISEASES.—Especially suitable are coccal infections and chilblains. High blood-pressure and convalescence from acute conditions are benefited by this treatment.

THE FINSSEN LAMP.—The principle of the Finsen lamp treatment of lupus was the focusing of the sun's rays through water-cooled lenses which were pressed on the skin to render it bloodless, thus allowing the rays to penetrate. The Carbon arc was subsequently substituted for the inconstant sunlight. It has, however, been discovered recently that simultaneous irradiation of the whole body by the Carbon arc greatly accelerates results, thus pointing to the fact that the general is more important than the local effect.

PILES.—See Haemorrhoids.

PINK DISEASE (ACRODYNIA)

This disease generally occurs between the ages of six months and two years, is not common in England and must be rare in India.

The striking symptom is the misery and irritability of the child, which is not surprising when the symptoms are considered. There is severe itching of the hands and feet which, with the nose and ears, turn a pink colour and sweat excessively, so a prickly-heat rash often comes out; the scalp may be similarly affected, and the child may literally tear its hair in agony; coupled with this is extreme photophobia, which makes the child bury its face in the pillow.

The disease lasts for about six months.

TREATMENT.—Certain similarities between this disease and pellagra suggest the giving of whole vitamin B complex in full doses, in the form of Lederle vitamin B complex Oral, Bemax or Marmite.

Durand and others report dramatic success with daily injections of 2,000 units (6 milligrams) of Vibex (thiamine hydrochloride; vitamin B₁). Injections were given for six days, after which the vitamin was given by mouth, but relapse soon occurred and was quickly relieved by further injections. Intramuscular injections of Vibex would therefore seem to be the treatment of choice. Nicotinic acid is also given.

Local measures consist of soothing lotions, such as calamine, and sometimes splints are required to prevent excessive scratching. Diet should be fresh and light.

Sedatives in the form of barbiturates or bromide and chloral may make the child less miserable.

PLAGUE (BUBONIC)

Infection is by the plague bacillus (*Pasteurella pestis*) which infects rat fleas, the cycle being from sewer rats (*R. decumanus*) to domestic rats (*R. rattus*), then to human beings, the fleas leaving each species of dead animals in turn.

Prophylaxis is by destroying the rats, preferably by cyanogen gas, Cymag or Calcid Bricketts powder, because it also kills the fleas. Rat traps of the cage type are preferable to the back-breaking type because the fleas leave dead animals as soon as they become cold. The cages, with rats inside, should be plunged in a bath of phenyle.

RAT POISON.—One part of barium carbonate made into pills with two parts of tallow or tallow may be scattered about in tempting places; the pills must be made with very clean hands and touched as little as possible because, to reverse the usual order, a rat smells a human being. The poisoned rats usually make for the nearest water.

Methyl fluoracetate is being used in the United States of America as a successful rat poison.

N.B.—In plague time a dead rat must be moved with tongs or sticks and then burnt, or thrown into phenyle, otherwise the fleas may jump on to the person handling the rat.

Inoculation with Haffkine Institute anti-plague vaccine confers immunity for six, and partial immunity for twelve months. Dosage is as follows:

		1st dose	2nd dose (8-10 days later)	Annual maintenance dose
Men	.. ..	1 c.c.	1 c.c.	1 c.c.
Women	.. ..	$\frac{1}{2}$ c.c.	$\frac{1}{2}$ c.c.	$\frac{1}{2}$ c.c.
Children	11-15 ..	0.4 c.c.	0.4 c.c.	0.4 c.c.
	5-10 ..	0.3 c.c.	0.3 c.c.	0.3 c.c.
	0-4 ..	0.2 c.c.	0.2 c.c.	0.2 c.c.

One double dose is given as prophylactic in plague epidemic.

Note.—As it takes eight days for immunity to develop, and the incubation period of the disease is between two and eight days, persons definitely exposed to infection should be put on sulphadiazine or sulphathiazole at once.

D.D.T. sprayed about a house discourages fleas.

BUBOES.—The situation depends upon that of the bite; as most people in India are bitten on the foot the buboes are generally in the groin, but they will be in the axilla if the bite is on the hand. There is some evidence that the buboes hold up the infecting organisms for about three days, after which the condition is a septicaemia. The importance of this is that pre-septicaemic treatment is more successful than post-septicaemic.

TREATMENT.—Sulphadiazine is the drug of choice, the cure-rate being 90% in pre-septicaemic and 80% in septicaemic cases; with sulphathiazole the cure-rate is about 10% lower.

The initial dose of either drug is 4 grammes, preferably half by the vein and half by the mouth, but not more than 2 grammes of soluble sulphathiazole should be given intravenously, even if the patient cannot swallow. This is followed by 2 grammes (four tablets) four hours later, and then by two tablets (1 gramme) every four hours. In very serious cases the first dose can be as high as 6 grammes. When the patient cannot swallow, the drug is given intravenously, with the above precaution about sulphathiazole.

The drug is given until the temperature has been normal for 48 hours, but should not be given for more than 10 days. The usual precautions about high fluid-intake (8-12 pints a day) are, of course, observed.

The old methods of treatment by intravenous iodine (1% with 2% potassium iodide, 10 c.c. daily for 4 or 5 days), and by intravenous serum—e.g., Solkhey's, in 100 c.c. doses, are now superseded, but in some hands the addition of serum to sulphadiazine therapy has noticeably improved the results.

Under the sulpha treatment, buboes seldom come to the stage of suppuration, but if they do, they should be opened with the usual precautions against spread of infection from infected pus.

PNEUMONIC PLAGUE.—Sulphadiazine and sulphathiazole have yet to be tried out on a large scale, but they would seem the

only method likely to cure this hitherto always fatal disease. Dosage should be as for bubonic plague.

Note.—Pneumonic plague is highly infectious by means of droplets. All attendants should, therefore, be recently inoculated, wear masks, gloves and gowns, and take all other precautions, and take sulphadiazine at the first sign of fever, cough or malaise.

PLEURISY (*See also* Empyema.)

This is of three kinds—(1) dry pleurisy, (2) pleurisy with effusion and (3) empyema.

Likewise, it is caused chiefly by three organisms—the pneumococcus, the tubercle bacillus and the streptococcus. Occasionally the staphylococcus, Friedländer's pneumo-bacillus or the influenza bacillus is found, and in pleurisy due to trauma any of the pyogenic organisms may be responsible.

DRY PLEURISY.—Most commonly this is an extension from underlying lung disease, the common acute dry pleurisy being due to pneumonia. In other cases, apart from trauma, the cause is usually found to be the tubercle bacillus. This, of course, often extends from the lung as well.

Treatment.—This is that of the causative disease, but locally much comfort is derived from strapping or from some application such as Antiplogistine.

PLEURISY WITH EFFUSION.—Although almost always due to tubercle this form often has a good prognosis.

Treatment.—To tap or not to tap? All effusions should be tapped if they are causing discomfort or cardiac embarrassment, about a pint of fluid being removed, depending upon the condition of the patient; it is seldom advisable to remove more than this amount at one sitting.

If an effusion shows no signs of diminishing after 6 weeks it should be tapped. In the writer's experience, simultaneous air replacement has not given such good results as simple removal of fluid, so is not advised. If X-ray photographs show tuberculosis of the lung, the hydrothorax is probably doing good by resting the lung and may later be replaced by pneumothorax.

Transudates due to heart or kidney disease or nutritional oedema can be dispelled by mercurial diuretics such as mersalyl or Neptal.

Tapping (paracentesis) is done as follows:

- (a) Connect up and test the Potain's apparatus.
- (b) Sterilize the skin and inject a local anaesthetic into a small part of the dull area, usually in the mid-axillary line between about the 8th and 9th ribs.
- (c) If a needle has not been put into the chest before, confirm the presence of fluid with a hypodermic syringe and needle through the anaesthetized spot.
- (d) Tell the assistant to close the tap between the bottle and the patient, to exhaust the air from the bottle and then to

close the other tap, thus leaving the bottle with a vacuum in it.

- (e) If the Potain's needle is a large one, make a preliminary nick in the anaesthetized skin with a cataract knife.
- (f) Instruct the patient to breathe very quietly and with the sharp trocar in the Potain's needle, push it through the anaesthetized area of chest wall into the pleural cavity, and withdraw the trocar, when fluid should run out. (If air runs in, the paracentesis is unnecessary.)
- (g) If the flow is good, let the fluid run into a basin and collect about a pint, otherwise connect the tube with the sidepiece on the needle, close the tap on the straight piece and open the tap into the bottle, when the fluid will be sucked in; if necessary, open the other tap and increase the vacuum by means of the pump.
- (h) When enough fluid has been collected, withdraw the trocar and seal the puncture with Tinct. Benzoin. Co.

The greatest care must be taken about asepsis, because any infection of the fluid in the chest may be disastrous.

Tubercle bacilli are seldom found, but should be looked for; if they are not seen, 10 c.c. of fluid should be injected into a guinea-pig.

PLUMBISM

Recent acute lead poisoning.—Get rid of as much lead as possible by stomach tube or emetic and convert the rest into insoluble lead sulphate by giving Mag. Sulph. half-an-ounce in water every two hours until free purgation occurs.

Subacute lead poisoning is shown by lead colic (which may mimic an acute abdomen, so in doubtful cases look for the blue line on the gums) and by lead encephalopathy. In the latter there may be epileptiform convulsions and mania; the condition is a very serious one and the immediate treatment is lumbar puncture.

TREATMENT.—The principle of treatment is to fix the lead temporarily in the bones, and later to release it in small doses and eliminate it.

To fix the lead in the bones give an intravenous injection of 10 c.c. of 10% calcium chloride, calcium gluconate or Calcium Sandoz every three hours on the first day, and then calcium by the mouth, gr. 20 of the lactate or gluconate three times a day, with vitamins D (5,000 units a day) and C (50 milligrams or more a day).

A diet rich in calcium—that is to say, with plenty of milk—is also given. Morphia and atropine relieve the pain of colic, if severe, but the calcium injections generally bring quick relief. When symptoms of *chronic poisoning* such as wrist drop or other lead palsy are present, elimination is carried out by giving ammonium chloride, 15 grains six times a day, with large quantities of water and a calcium-low diet. This method is safer than either the potassium iodide or Parathormone method. If symptoms of

sub-acute poisoning occur the ammonium chloride is stopped at once and calcium therapy renewed.

PNEUMONIA, LOBAR

"The disease is in the lungs, but the danger is in the heart."

The object of treatment is to destroy the causative organisms, to reduce the inflammation and prevent its spread, to eliminate toxins, to support the patient's strength and to make him comfortable.

The first is achieved by sulphonamides, helped in severe or obstinate cases by penicillin and it may be said at once that since the discovery of these remedies, the mortality has been reduced to about a fifth of its former figure and the disease is no longer "captain of the men of death". They therefore form by far the most important part of treatment. The original sulphapyridine (M. & B. 693) is now largely replaced by other compounds causing less nausea, but with all of them it is important to start with a relatively large dose—e.g., four to six tablets; two tablets being given four-hourly thereafter. When vomiting or nausea prevents absorption by the mouth, the soluble form of the drug is given intravenously. In this disease, penicillin has only a slight advantage over the newer sulphonamides.

Reduction of inflammation and prevention of spread are brought about largely by the treatment just described, but certain adjuvants are both helpful and comforting, the most useful being an Anti-phlogistine plaster, which is applied pleasantly hot once in 24 hours over the affected area. To ensure that the plaster is not too hot or too cold it should be felt with the back of the finger before being applied. The sick-room should be kept at an even temperature, the air should be as fresh as possible, the patient's chest should be warmly but lightly covered and the bed-clothes adequate but not excessive.

Toxins are best eliminated by a dose of castor oil. The patient's strength is supported by injections of Coramine, nikethamide, camphor in oil, or some such preparation; brandy and champagne also have their uses. If there is respiratory distress or if the heart shows signs of failing, oxygen must be given, preferably through an intra-nasal catheter fixed to the patient's cheek by a piece of sticking plaster; the funnel and tube method is useless. Cyanosis usually means that the right heart is failing; this can be relieved by bleeding, 12–20 ounces being sufficient (for method, see Venesection). As the ordinary digitalis takes several hours to work, preparations of the drug are useless in pneumonia; intravenous injection of strophanthin gr. $\frac{1}{16}$ or Digoxin (*Digitalis lanata*) one milligram, has a rapid effect on the heart, and improves its tone quickly; the injection may be repeated once after 2 hours.

Comfort is secured by preventing pain, dyspnoea, insomnia or irritating cough. Much argument has taken place about the advisability of morphia in pneumonia, because it depresses the respiratory centre. The best answer is to give heroin, which not only

alleviates pain but stimulates the breathing; it has to be given with care because of its notorious propensity for habit-forming. If heroin is unobtainable, morphia or Omnopon may be given with atropine.

Dyspnoea is prevented by the measures prescribed above for supporting the heart.

Insomnia, unless due to pain, is best treated by a barbiturate such as Gardenal in $1\frac{1}{2}$ –3 grain doses, and irritating cough can be prevented by using plenty of pillows.

The following linctus will be found useful for checking an irritative, painful, spasmodic cough:

. R	Codinae Phosph.	..	..	..	gr. $\frac{1}{2}$
	Sod. Bromid.	..	..	..	gr. $\frac{5}{8}$
	Tinct. Belladonnae	..	..	..	℥ $\frac{5}{8}$
	Tinct. Camph. Co.	}	..	..	℥ 10
	Syrup. Tolu.				
	Glycerin.				
	Aq ad				℥j
A teaspoonful to be swallowed slowly when required. Heroin hydrochlor. gr. $\frac{1}{2}$ may be substituted for the codeine phosphate.					

Even with successful chemotherapy, convalescence must not be hurried; the patient should remain in bed for at least a week after the temperature has become normal, and should not return to work until at least a month later, and then only if there are no physical signs. Common sequelae of neglecting these precautions are chronic bronchitis and irritable heart; occasionally pleurisy or tuberculosis.

PNEUMONIA IN INFANTS.—Two points of importance are the relatively high doses of sulpha drugs required, and the usefulness of penicillin. Doses of sulphadiazine and sulphathiazole are as follows.

A child of one month requires one tablet (0.5 gramme) four-hourly for 2 days, and then six-hourly for at least 3 days.

A child of six months should be given two tablets (1 gramme) as the first dose, followed by the same as above.

Vomiting in the early stages should be disregarded; it generally ceases as the child improves.

BRONCHO-PNEUMONIA.—The drug of choice is penicillin in the usual doses, sulphathiazole and sulphadiazine are given as for lobar pneumonia.

Fresh air, supplemented by oxygen in severe cases, is a necessity. Restlessness is best overcome by a grain of Gardenal with three grains of aspirin, but in the case of children this should not be repeated.

PRIMARY ATYPICAL PNEUMONIA.—The disease is probably not new, but its discovery is, because it was made chiefly by X-rays. The cause is so far unknown, but is probably a virus and the disease tends to occur in small outbreaks. Psittacosis can cause a similar condition.

CLINICAL FEATURES.—These vary greatly, some cases being much more severe than others, some lasting only a few days, others two or three weeks, so it is difficult to describe an average case, but the feature that has led to the differentiation of the disease is the presence of X-ray shadows out of proportion to the physical signs.

The Onset may be gradual, but is much more usually abrupt, with malaise, a shivery feeling not amounting to rigor, complete loss of appetite, and a temperature between 100° and 105° F. The temperature tends to remain steady and high for the first week or ten days, after which it subsides slowly, reaching normal after about the same period of time.

The Pulse is relatively slow, and the respiration, though slightly quickened, is nothing like so fast as in pneumonia.

Cough appears a few days after the onset and can be troublesome; a feature of the sputum is the very high proportion of mononuclear cells.

PHYSICAL SIGNS.—As a rule these do not appear for several days, but repeated careful examination will be rewarded sooner or later by the hearing of sticky crepitations at one or other base, or less commonly in the higher parts of the lung; in other cases the adventitious sounds are coarse and moist. The physical signs may persist long after the patient is well.

White-cell Count.—This is important, because it remains normal, any marked leucocytosis suggesting a superimposed infection.

X-rays.—As already remarked, the picture shows more than one would expect, but it is extremely variable. Mottling, "ground glass appearance", bronchial shadows, hilar shadows, and single and multiple patches of congestion all having been described.

Treatment is another important diagnostic point, because the condition does not respond to chemotherapy, so treatment is along the ordinary general lines of rest in bed, light nourishing food, expectorants and sedatives.

Prognosis is almost uniformly good, only a few deaths having been recorded.

"Even though there does not appear to be 'much in the chest' in patients with high fever for no obvious reason, any degree of cough and even scanty signs in the lungs should lead to an X-ray examination and a white count being carried out before chemotherapy is started." (R. W. D. Turner.)

POISONING

This is the most urgent of all emergencies and calls for immediate action and treatment even before a definite diagnosis is made, and it must be borne in mind that the case is either suicidal, homicidal or accidental and therefore may have important medico-legal bearings.

1. The stomach must be emptied by either an emetic or stomach tube, except in the case of corrosives. To determine this point, there will generally be marks on the lips and upper surface of the tongue,

or the breath will smell; if not, moisten your finger, touch the patient's lips and then taste your finger.

2. If a stomach tube is available, wash out the stomach 6-8 times with half a pint of warm water, each time syphoning out in the usual way until the washings are clear. Keep the washings, vomit and urine for analysis.

3. If the stomach tube is not available, give an emetic. The following can be obtained in any house:

- (a) Salt or Mustard—a tablespoonful in half a pint of warm water.
- (b) Three large cupfuls of tepid dish-water.
- (c) Then if the patient does not vomit, tickle the back of the throat with the finger.
- (d) If you have emetics with you, give one from the following list:
 - (1) Pulv. Ipecac.—30 gr. in water.
 - (2) Zinc sulphate—30 gr. in 8 oz. water.
 - (3) Copper sulphate—5 gr. in half a pint of tepid water.
 - (4) Vinum Ipecac.—1 oz. in half a pint of tepid water.

If the patient is comatose, give apomorphine hydrochlor. $\frac{1}{8}$ — $\frac{1}{2}$ gr. hypodermically.

4. While carrying out this treatment, make your diagnosis as to the particular poison, from the smell, appearance and taste of the remains in the receptacle from which the poison was swallowed and from the following symptoms (see *Diagnosis below*).

5. In these cases the friends and relations of the patient are naturally anxious, and it is better to distract their attention by giving them something to do, and, incidentally, preparing for the next stage of the treatment. With this in view, instruct one person to beat up an egg in half a pint of cold milk, another to boil a small kettle of water with a handful of tea in it, and a third to prepare hot bottles and blankets.

DIAGNOSIS.—For diagnosis of the particular kind of poisoning, the following list is taken from Murrell's *What to do in Cases of Poisoning*:

(1) YOU WILL FIND THE PATIENT DEAD:

Prussic Acid.	Carbon Monoxide.
Potassium Cyanide.	Oxalic Acid.
Strong Ammonia.	Other active poisons given in
Carbonic Acid Gas.	large doses.

(2) PATIENT IS COMATOSE:

Opium.	Chloral.
Morphia.	Chloroform.
Alcohol.	Camphor.
Carbolic Acid.	

(3) PATIENT IS COLLAPSED:

Strong Acids.	Tobacco.
Alkalis.	Antipyrin.
Aconite.	Antifebrin.
Antimony.	Last stage of most poisons.
Arsenic.	

(4) PATIENT IS CYANOSSED:

Aniline.	Antifebrin.
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(5) PATIENT IS DELIRIOUS:

Cannabis Indica.	Hyoscyamus.
Belladonna	Alcohol.
Datura } Noisy.	Camphor.

(6) PATIENT IS TETANIZED:

Nux Vomica.	Antimony.
Strychnine.	Excessive pain also approaches this condition.
Arsenic.	

(7) PATIENT IS PARALYZED:

Aconite.	Lead.
Arsenic.	Conium.

(8) PUPILS DILATED:

Datura.	Chloroform.
Belladonna.	Alcohol.
Hyoscyamus (in the early stage).	Opium } In the last stage.
	Aconite }

(9) PUPILS CONTRACTED:

Opium.	Physostigmine.
Chloral.	Carbolic Acid.

(10) SKIN IS DRY:

Datura.	Belladonna.
Hyoscyamus.	

(11) SKIN IS MOIST:

Opium.	Tobacco.
Aconite.	Other poisons in the stage of collapse.
Antimony.	
Alcohol.	

(12) MOUTH IS BLEACHED:

Carbolic Acid.	Caustic Acids and Alkalis.
Corrosive Sublimate.	

(13) THERE IS VOMITING:

Arsenic (brown with blood).	Aconite.
Antimony (white).	Ammonia.
Digitalis (green).	Phosphorus, etc.

GENERAL TREATMENT.—

1. After lavage leave the tube *in situ*; it is a convenient means of introducing further treatment. Now give the egg and milk, followed by the strong tea cooled down with cold water. The immediate urgency is now over.

2. By this time you will have been able to obtain the chemical or physiological (if one be known) antidotes which then proceed to administer.

3. HASTEN ELIMINATION of the poison by:

- (a) Intravenous infusion of normal saline solution in poisoning with alkaloids.
- (b) Aperients.

4. TREAT SPECIAL SYMPTOMS:

- (1) **COLLAPSE.**—Hot bottles, hot blankets; strong coffee by mouth or rectum; elevate foot of bed; collapse due to pain is best treated by an injection of morphia.
- (2) **SYNCOPE.**—Recumbency; ether or strychnine hypodermically; Sp. Amm. Aromat. by the mouth; faradism; mustard leaf to pericardial region.
- (3) **RESPIRATORY FAILURE.**—Artificial respiration; cold affusion; tracheotomy if there is laryngeal obstruction; oxygen inhalation; lobeline.
- (4) **PAIN.**—Morphia, hypodermically, if severe.
- (5) When poison has been eliminated as far as possible, GIVE DEMULCENTS.

Note.—Retention of urine as well as suppression may occur in cases of poisoning.

TREATMENT APPLICABLE TO EACH PARTICULAR POISON. (For reference numbers quoted below see pp. 692-3.)

Poisons	Treatment
ACIDS, MINERAL	<i>Caution.</i> —Lavage and emetics not admissible.
Sulphuric.	Chemical antidotes Nos. 1, 2, 3 and 4.
Hydrochloric.	Demulcents Nos. 1, 3 and 4.
Nitric.	Do not use carbonates to neutralize acids if magnesia can be obtained.
Acetic.	Lavage with care. Wash out with magnesium or sodium sulphate $\frac{1}{2}$ oz., in 8 oz. of water.
Battery fluids.	Do not rely on emetics.
Soldering fluids.	Demulcents Nos. 1 and 2.
ACID CARBOLIC	Stimulants—freely.
Creosote.	Saline—intravenously or per rectum.
Disinfecting fluids.	

<i>Poisons</i>	<i>Treatment</i>
ACID HYDROCYANIC (Prussic Acid) Oil of Bitter Almonds. Cyanides.	General treatment, particularly for respiratory failure. Stimulants Nos. 1, 4, 5 and 9.
ACID OXALIC Salt of Lemon. Salt of Sorrel.	Caution.—Lavage and emetics only if case is treated soon after ingestion of poison, and then cautiously. Chemical antidotes Nos. 1 and 4, not 2 or 3. Do not give sodium or potassium carbonates; the resulting compounds are soluble and poisonous.
ACONITE	General treatment, especially for respiratory failure. Stimulants Nos. 1 and 6. Saline infusion.
ALCOHOL	General treatment, especially cold affusion, faradism and artificial respiration.
ALKALIS Potash. Soda. Ammonia. Weed-killer (Non-arsenical).	Caution.—Lavage and emetics not admissible. Chemical antidotes Nos. 5 and 6. Demulcents Nos. 1, 2 and 4. Stimulants.
ANILINE.	Stimulants. Artificial respiration. Bleeding. Intravenous saline.
ANTIMONY SALTS Tartar Emetic. Butter of Antimony.	General treatment, especially stimulants and treatment for collapse. Vomiting generally occurs from the action of the poison; give copious draughts of warm water. Chemical antidote No. 12. Demulcents Nos. 1 and 4.
ARSENIC COMPOUNDS White Arsenic. Weed-killers. Sheep dips. Some vermin-killers. Some fly-papers.	General treatment. Chemical antidote No. 8. Demulcents.

TOXIC EFFECTS FOLLOWING THE EMPLOYMENT OF ARSENO-BENZOL PREPARATIONS

The following is the report of the Salvarsan Committee of the Medical Research Council:

1. No special arsenobenzol preparation can be regarded as more likely than others to produce ill effects.
2. Large series of cases of syphilis have been treated without the occurrence of any serious ill effects, although a small percentage of slighter reactions, chiefly vasomotor and mild skin reactions, is to be expected in every large collection of patients treated with arsenobenzol compounds.
3. Errors in technique cannot account for more than a few serious accidents; fatalities have occurred even under the most careful control in large and completely equipped hospitals.
4. The most important ill effects which may end fatally are:
 - (a) Encephalitis hæmorrhagica.
 - (b) Acute yellow atrophy of the liver.
 - (c) Exfoliative dermatitis and its complications.
5. In European literature, and especially in the very large German literature, encephalitis hæmorrhagica is most frequently described. In Great Britain and America, however, exfoliative dermatitis and its septic complications have accounted for most fatal accidents. Acute yellow atrophy of the liver is difficult to place in order of frequency, being distinguished from the other serious ill effects by its peculiar liability to occur in localized outbreaks. Single cases, however, are by no means unknown.
6. Encephalitis hæmorrhagica occurs within two to five days after an injection, and presents a very characteristic clinical picture. Its incidence is most frequent after the second injection, but it may ensue after any one of a series of injections. It must be considered as due to the arsenobenzol treatment.
7. Disorders of the liver following treatment by arsenobenzol compounds may for convenience be grouped into:
 - (a) Early (benign) jaundice.
 - (b) Late (severe) jaundice.
 - (c) Acute yellow atrophy of the liver, commonly the sequel of late jaundice, and clinically and pathologically indistinguishable from the same condition occurring in the known absence of syphilis.
8. Skin reactions following arsenobenzol are fairly common, and usually slight and transient. The one reaction of serious significance is exfoliative dermatitis.
9. Vasomotor phenomena occur in a small proportion of cases, even under the best conditions. Although alarming at the time, they are rarely, if ever, fatal. They appear to bear no relation to anaphylaxis, and the use of this word in describing them is to be deprecated. Febrile disturbances, headache, diarrhoea and vomiting also occur, but are usually of slight moment.
10. Certain other ill effects of arsenobenzol treatment, which may even end fatally, are met with only very rarely. These include acute renal damage, ulcerative enteritis, polyneuritis, and aplastic anaemia.

BARBITURATES

Poisoning with barbituric acid derivatives is not uncommon, particularly as these drugs are so readily obtained. As the coma deepens, bronchitis and basal pneumonia develop in most cases, and it is from these that most patients die. Other complications are a toxic myocarditis, with great weakening in the force of the heart,

and so the rapid pulse rate is accompanied by a falling blood-pressure, and the toxic renal effects may produce urinary suppression. There is a great variation in individual susceptibility, but patients with previous myocarditis or with hepatic or renal deficiency are much more readily affected. Eliminative treatment is mainly directed to washing out as much drug as possible by repeated gastric and colonic lavage, by giving copious fluids and glucose by a nasal tube and by the rectum, and by removal from the brain by repeated withdrawal of cerebrospinal fluid. Ten c.c. of C.S.F. should be withdrawn by lumbar or cisternal puncture each 12-24 hours. Specific measures claimed to be of value are: (i) the slow intravenous injection of 30 c.c. of 30% alcohol each hour until the patient wakes; (ii) the use of full doses of strychnine or Coramine; (iii) the cautious intravenous administration of picrotoxin in doses of 6-12 mg. at the rate of 1-2 mg. a minute; the drug takes about 15 minutes to act and is stopped as soon as there are signs of improvement.

<i>Poisons</i>	<i>Treatment</i>
BARIUM SALTS	General treatment. Chemical antidote No. 7.
BELLADONNA	General treatment, especially for
<i>Datura.</i>	respiratory failure.
<i>Stramonium.</i>	Chemical antidote No. 12.
<i>Hyoscyamus.</i>	Physiological antidote No. 7.
CALABAR BEAN	Lavage or emetic. Chemical antidote No. 12. Physiological antidote Nos. 2 and 3.
CAMPHOR	Stimulant No. 6.
<i>Lin. Camph.</i>	Artificial respiration.
CANTHARIDES	General treatment.
	<i>Be careful if mouth or oesophagus is blistered.</i>
	Demulcents.
CHLOROFORM	General treatment, especially fresh air, stimulation and artificial respiration. Physiological antidote No. 1.
COCAINE	General treatment. Stimulants Nos. 4, 6 and 9. Physiological antidote No. 1.
COPPER SALTS	General treatment.
<i>Blue Vitriol.</i>	Chemical antidote No. 2 or
<i>Verdigris.</i>	potassium ferrocyanide 10 gr., in 2 oz. of water.
	Demulcent No. 1; copiously.

<i>Poisons</i>	<i>Treatment</i>
DIGITALIS	General treatment. Chemical antidote No. 12.
ERGOT	Lavage or emetic. Chemical antidote No. 12. Friction. Recumbent position. Stimulants.
FUNGI	Lavage or emetic. Physiological antidote No. 2. Stimulants. Purgatives.
GASES	General treatment, especially
Carbon Monoxide.	artificial respiration and oxygen
Carbon Dioxide.	inhalation.
Grain-pit gas.	Blood transfusion for treatment
Sewer gas.	of carbon monoxide poisoning.
Coal gas.	
Acetylene.	
Chlorine.	
Nitrous fumes.	
HEMLOCK	Lavage or emetics. Chemical antidote No. 12. Stimulants. Friction.
HYPNOTICS	General treatment.
Chloral Hydrate.	Stimulants, especially No. 6.
Chloralamide.	Do not rely on emetics.
Sulphonal.	
Paraldehyde.	
INDIAN HEMP (Cannabis Indica)	Lavage, emetics, purgatives. Stimulants. Chemical antidotes Nos. 5 and 6.
IODINE	General treatment. Chemical antidote No. 4. Demulcents, copiously.
LEAD SALTS (see Plumbism.)	General treatment. Chemical antidote No. 7.
LOBELIA	Lavage, emetics. Chemical antidote No. 12. Stimulants. Friction.
MERCURY SALTS	General treatment. Demulcents Nos. 1 and 4, very freely.

Poisons

MINERAL OILS

Benzoline.

Paraffin.

Petroleum.

OLEANDER

OPIUM

Morphia.

Codeine.

Chlorodyne.

Laudanum.

Paregoric.

Syrup of Poppy.

Teething powders.

Soothing syrups.

PHOSPHORUS

PUTRID FOOD

Tinned food.

RAT PASTES

SILVER SALTS

STRYCHNINE

TURPENTINE

Polishing fluids.

Polishing pastes.

VEGETABLE IRRITANTS

Unidentified plants.

Violent purgatives.

Savin.

Squill.

Nicotine.

Tobacco.

Treatment

General treatment.

Demulcent No. 2, freely, followed by free lavage with milk.

General treatment.

Chemical antidote No. 12.

Injections of ether and morphia.

Caution.—Do not overdo forced movements, rousing and exposure.

General treatment.

Do not rely on emetics.

Chemical antidote No. 11, freely washing out after each dose. (Permanganates are not altogether harmless remedies.)

Physiological antidote No. 2.

Stimulants, freely.

General treatment.

Chemical antidotes Nos. 9 and 10.

Demulcents, carefully avoiding oil.

General treatment, especially for collapse.

Chemical antidote No. 12.

See Arsenic and Phosphorus.

General treatment.

Chemical antidote: Common salt $\frac{1}{2}$ oz., in a pint of water.

Demulcents Nos. 1 and 4.

General treatment.

Place patient under chloroform, then give Emetic or Curarine or Myanesin lavage.

Chemical antidote No. 12.

Physiological antidote No. 3 or 8.

General treatment.

Lavage with milk.

General treatment.

Demulcent No. 1.

Milk, freely by stomach tube.

*Poisons**Treatment***ZINC SALTS**

White Vitriol.
Burnett's fluid.
Soldering fluid.

Caution.—Lavage and emetics are not admissible, except in poisoning with neutral salts.
Chemical antidote No. 2.
Demulcent No. 1.
Milk, copiously.

PHYSIOLOGICAL ANTIDOTES.—

1. Amyl nitrite capsules—3 ℥, for inhalation.
2. Atropine sulphate— $\frac{1}{8}$ gr., hypodermically.
3. Chloral hydrate—40 gr. in 3 oz. of water, by rectum or mouth.
4. Chloroform—for inhalation.
5. Strophanthin— $\frac{1}{8}$ gr. intravenously; Coramine.
6. Morphine tartrate— $\frac{1}{4}$ gr., hypodermically.
7. Pilocarpine nitrate— $\frac{1}{4}$ gr., hypodermically.
8. Potassium bromide—30–60 gr. in water, by the mouth.

NORMAL SALINE SOLUTION.—Common salt, 80 gr., in one pint of sterilized water at 98.4° F.

CHEMICAL ANTIDOTES.—

1. Chalk, whiting, or wall plaster— $\frac{1}{2}$ oz. stirred up in water.
2. Sodium or potassium bicarbonate—120 gr. in water; only used for acids in the absence of magnesia and chalk, on account of the rapid evolution of gas.
3. Magnesia— $\frac{1}{2}$ oz. stirred up in water.
4. Saccharated solution of lime—1–2 fl. dr. in water.
5. Citric or tartaric acid—20 gr. in water.
6. Vinegar or lime juice—1 oz., diluted with water.
7. Magnesium or sodium sulphate— $\frac{1}{2}$ oz. in 8 oz. of water.
8. Hydrated ferric oxide—produced by adding to $\frac{1}{2}$ oz. solution of ferric chloride in 8 oz. of water, either $\frac{1}{2}$ oz. magnesia, or 2 fl. dr. solution of ammonia.
9. Copper sulphate—2 $\frac{1}{2}$ gr., in 2 or 3 oz. of water.
10. French turpentine or Sanitas—30 ℥, in 1 oz. of water, repeated about four times in the first hour.
11. Potassium permanganate—5 gr., in half a pint of water.
12. Tannic acid—30 gr., in water, or in the form of strong tea.

DEMULCENTS.—

1. Milk.
2. Olive oil.
3. Thick gruel—fine oatmeal 1 oz., mixed and boiled with 10 oz. of water.
4. White of egg.

STIMULANTS.—

1. Brandy or whisky—1–2 oz. with 4 oz. of warm water by the mouth; $\frac{1}{2}$ –1 oz. with 2 oz. of warm water by rectum; 1–2 dr., hypodermically.

2. Champagne.
3. Mist. Ammoniac et Aetheris—1-2 oz. by mouth.
4. Spt. Amm. Aromat.—2 dr. in 2 oz. of water.
5. Ether—30-60 m, hypodermically.
6. Strychnine hydrochlor.— $\frac{1}{8}$ gr., hypodermically.
7. Coffee—2 oz., to be boiled with $\frac{1}{2}$ pint of water.
8. Mustard leaf.
9. Smelling bottle.

POISONS ACT, INDIAN—See Drugs.

POLYPUS, RECTAL—See Rectum.

POST-NASAL GROWTHS—See Tonsils and Adenoids.

POTT'S DISEASE—See Spinal Caries.

PREGNANCY, DISORDERS OF—See Obstetrics.

PREMATURITY (For full details see Obstetric Nursing.)

Important points are:

- (1) To maintain warmth. This is best done by dressing the child in Gamgee tissue or cotton-wool and wrapping it in a small electric blanket—e.g., Thermega. Failing this, hot-water bottles should be laid between blankets and changed as necessary. When the child's napkin is changed be very careful to expose as little skin as possible.
- (2) *Feeding*.—To begin with, this is usually done hourly, about half a drachm of breast milk being given for each pound in weight. The milk is drawn off from the mother and fed to the baby by means of a pipette. If the mother has no milk, sterilize some from a wet-nurse or make up weak artificial feeds.
- (3) *Avoidance of infection*.—The child must be isolated and all attendants must wear face masks.
- (4) One-tenth of a gram of Thyroideum Siccum for each pound in body weight may be given to maintain warmth, or a daily dose of 5,000 units of oestrogen.

PRIAPISM

This awkward complaint is best treated in the first instance by aspiration of both corpora cavernosa with a wide-bore needle under local anaesthesia; the corpora are then washed out with saline once or twice.

Disappointed with recurrences after this method, Hamilton Bailey advises giving a low spinal anaesthetic; if the priapism does not subside thrombosis has occurred, so a longitudinal incision is made along each side of the penis, the clot turned out and the wounds sewn up; in severe cases the dorsal arteries may be tied as

well. Strict asepsis and local chemotherapy during the operation are essential.

In all cases a blood slide should be examined, and also the spleen because leukaemia is an occasional cause.

PRICKLY HEAT

If a change to a cool climate is impossible, treatment is as follows:

The patient should:

- Remove damp clothes as soon as possible.
- Wear loose clothes; or if a child, none.
- Avoid hot drinks, or long drinks taken quickly.
- Take plenty of salt (2-4 drachms daily).
- Have one or two tepid baths a day, but never use soap to the affected areas.

Lotions to be dabbed on to the affected areas:

R. Menthol. . . . .	..	gr. 20	R. Acid. Hydrochlor. Conc.	3j
Hydrarg. Perchlor.	..	gr. 5	Hydrarg. Perchlor.	.. gr. 5
Spirit ad . . . . .	..	3x	Aq. ad . . . . .	.. 3x
R. Sulphur, Praecip.	..	gr. 5	R. Aluminii Sulph.	.. gr. 10
Lotio Calaminae ad	..	3j	Aq. ad . . . . .	.. 3j
R. Lotio Plumbi				

Powders to be applied to the affected areas:

R. Acid. Boric.	}	..	..	..	..	3j
Zinc. Oxid.						
Starch						
Camphor						3j
10% of sulphathiazole may be added if there is sepsis present.						

Calamine powder is also useful.

PRIMARY ATYPICAL PNEUMONIA—See Pneumonia, Lobar.

PROCTITIS—See Worms (Bilharzia); Lymphogranuloma Inguinale; and Rectum.

PROGRESSIVE MUSCULAR ATROPHY—See Nervous System.

PROLAPSE OF RECTUM—See Rectum.

PROSTATE (See also Urine; Retention, Extravasation and Suppression.)

SENILE ENLARGEMENT.—

"Never remove the prostate of a man with a dry, brown tongue; he will die of uraemia." (G. N. Sen.)

Often patients with prostate disease first come under notice because they are suffering from retention of urine; the usual history is that they have been passing urine in small dribblets, but the real truth is that the bladder is full and the patient has overflow incontinence. Sometimes there is acute retention with corresponding agony.

The first thing to do, therefore, is to palpate and percuss the

abdomen to discover the state of the bladder; a rectal examination should also be done, when the prostate is examined, and the bladder, if full, palpated bimanually.

If the bladder is distended, pass a rubber catheter and drain off the urine; some should be run into a sterile test-tube for chemical and bacterial examination; the urea percentage should be estimated and the urine examined for cells, organisms and casts.

If a rubber catheter will not pass, try a large metal one (not less than number 8), a finger in the rectum being used as a guide and help. Bicoudé catheters are the ideal, but they are seldom available in India; the writer prefers the ordinary litholapaxy evacuating catheter to any other for this purpose. If catheterization is impossible, suprapubic drainage is necessary.

In an early case when the patient has had one or two attacks of partial retention, much may be done by means of hormone treatment; for instance, 10 mg. of Perandren (testosterone propionate) daily for a week, and later three times a week; or a tablet of methyl testosterone may be swallowed twice or three times a day. At the same time give some such mixture as the following:

B. Sod. Sulph.					
Sod Bicarb					
Pot. Cit					
Tinct. Hyoscyami	..	..	..	..	℥ 30-60
Tinct. Belladonnae	..	..	..	..	℥ 5
Infus. Buchu ad	..	..	..	..	℥ 3

One ounce morning and evening.

The patient is told to avoid constipation, a full bladder and indulgence in alcohol; many of these patients are old and feeble and have been accustomed to a little alcohol, the withdrawal of which would cause more general damage than local benefit, so they may be allowed a strictly moderate ration. Some patients can carry on for years in this way, but the effect of androgen therapy over long periods of years is not yet known.

Operation is undoubtedly the best treatment, and since the writer and his associates took to doing the two stage operation in every case their mortality has been practically nil. The preliminary suprapubic operation is usually done 2 or 3 weeks before the prostatectomy, but this period varies with the condition of the patient. A practical point worth noting is that the preliminary suprapubic cystotomy should be done as high up as possible, the peritoneum being gently reflected off the bladder. This precaution leaves the surgeon with much more room when he comes to do the second operation. The main drawbacks of the two-stage operation are that owing to contraction of the bladder and the presence of cicatricial tissue the removal of the prostate is rather more difficult, and, further, that the patient, having had one operation, may refuse a second. On the other hand, owing to lack of congestion there is much less bleeding, uraemia is rare and shock is less; these being the three great causes of death after prostatectomy the argument in favour of the two-stage operation is strong.

Millin's extravascular method causes less shock than the intravascular.

FIBROSIS OF THE PROSTATE.—Like fibrosis elsewhere, this commonly is the result of chronic inflammation, although some prostates with senile enlargement are much more fibrous than others, and consequently much more difficult and dangerous to enucleate.

PROSTATITIS.—This generally is the result of urethritis and is amenable to chemotherapy, helped sometimes by prostatic massage.

CARCINOMA OF THE PROSTATE.—This can be much improved by intensive oestrogen treatment.

TUBERCULOSIS OF THE PROSTATE.—This sometimes occurs in young people with genito-urinary tuberculosis.

PROTEIN SHOCK TREATMENT, OR NON-SPECIFIC PROTEIN THERAPY

There is a great deal of evidence to show that the intravenous injection of 50 c.c. of a 10% solution of peptone, a 50 million dose of typhoid vaccine or 5–10 c.c. of sterilized milk intramuscularly, produces a reaction which leads to a beneficial result in a number of infectious diseases, particularly in septicaemia, puerperal infection, rheumatoid arthritis, coliform infections of the urinary tract, asthma, and skin lesions such as psoriasis, pemphigus and eczema.

During treatment the patient is kept lying down having been prepared by a purgative and light diet. The injection is given slowly into a vein, and in from one to six hours there is a feeling of malaise, and a rise of temperature from 102°–104° F. If the reaction is excessive with dyspnoea and vomiting, it is controlled by $\frac{1}{16}$ gr. of atropine and 5 $\frac{1}{4}$ of 1 in 1,000 adrenaline.

When the patient has settled down in 3 or 4 days' time the injection is repeated; the number of injections will depend upon the result obtained and the condition of the patient.

The way in which immunity is helped by this treatment is unknown, but Lord Horder considers that it may prove to be nearer the mechanism by which natural immunity is achieved, than is at present supposed. In many cases non-specific vaccine therapy is as efficacious as the use of specific vaccines.

PRURITUS (*See also Anus and Gynaecology.*)

Treatment must be directed to finding out the cause and if possible removing it; first think of parasites and drugs, but it may be due to diabetes, gout or gastro-intestinal disease. The majority of patients are improved by a vegetarian diet excluding coffee, tea, alcohol and all highly spiced foods. Internally sodium salicylate alone or combined with phenazone or phenacetin, or carbolic acid in pill may be given.

External treatment should also be employed; one of the most simple and effectual means is an evaporating lotion. The following may be tried:

R Acid. Carbolic.	℥j	R Acid. Hydrocyanic. Dil. . .	℥iss
Glycerin.	℥ss	Sp. Rosmarini	℥j
Aquam ad	℥viii	Glycerin	℥ss
		Aquam ad	℥x
R Ichthyolis	℥ss	R Liq. Carbonis Deterg. . .	℥jss
Sod. Bicarb.	℥jss	Aquam ad	℥j
Sp. Lavandulae	℥ss		Sponge on.
Aquam ad	℥viii		

In very severe cases the withdrawal of 5℥ of cerebrospinal fluid by lumbar puncture often gives immediate relief.

PSITTACOSIS

This condition, a virus infection, is clinically almost indistinguishable from typhoid, but the lung symptoms are more marked and blood cultures are negative, although an *early* positive Widal reaction may be found.

The green, South American parrot is the common source of infection, but other birds, notably the budgerigar, can convey it.

Treatment.—This is as for enteric, but there is evidence that penicillin is effective, so it should be given in the usual doses.

PSORIASIS . . .

The essential feature is the presence of fine silvery scales, which even in the earliest stages can be demonstrated by scratching with the finger-nail. If not exactly symmetrical, the eruption is at any rate bilateral and tends to affect the extensor rather than the flexor surfaces. The disease is commoner in cold climates, where it forms about 3% of all such diseases, but is not very often seen in India.

TREATMENT.—

General.—Meat, alcohol and hot curries should be avoided, and many of these patients improve on a vegetarian diet.

Arsenic and thyroid gland are old-fashioned remedies which are still popular because they are often beneficial. Three to five minims of Liquor Arsenicalis with $\frac{1}{2}$ grain of Thyroideum Siccum may be given twice or three times a day.

Local.—By far the best local remedy the writer has so far used is:

R Derobin (Glaxo)	gr. 1
Acid Salicylic.	gr. 5
Hydrarg. Ammoniac.	gr. 10
Liq. Carbonis Deterg.	℥ 30
Paraff. Moll. ad	℥j

Cignolin is similar to Derobin.

Before the ointment is applied, the skin should be well scrubbed and dried, some bicarbonate of soda in the water helping to remove the scales, which is essential in order to allow the ointment to penetrate. The ointment is applied twice daily to the affected areas only. Derobin does not stain the linen as does chrysarobin. Under this treatment the lesions usually clear up in about 10 days.

Norman Walker recommends the following:

R. Chrysarobin ..	..	..	..	gr. 20
Ol. Rusci (<i>B.P.C.</i>) (Birch-tar Oil) ..	..	..	..	℥ 20
Acid. Salicylic. ..	..	..	..	gr. 10
Vaseline ad ..	..	..	..	5j

This must be used with caution, applied to the areas for a few days until they have become inflamed, and then replaced with some soothing application such as zinc ointment to which pine-tar oil has been added, one drachm to the ounce.

For the scalp, chrysarobin ointment is generally replaced by some such preparation as:

R. Liquor. Carbonis Deterg. or Liq. Picis				
Carb. ..	..	..	..	5j
Sulphur. Præcip. ..	..	..	..	gr. 30
Acid. Salicylic. ..	..	..	..	gr. 10
Coconut Oil ad ..	..	..	..	5j

or, preferably, the Derobin ointment already mentioned.

If chrysarobin is applied to the scalp it must be with caution. Hodara's prescription is:

R. Chrysarobin. ..	..	..	..	5j
Glycerin. }	..	..	..	aa 5ss
Chloroform. }	..	..	..

Always warn a patient that chrysarobin stains the linen purple and that the colour does not wash out.

PSYCHONEUROSES—See *Hysteria and Mental Diseases*.

PTOMAIN POISONING—See *Food Poisoning*.

PUBLIC HEALTH

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INSPECTIONS—SANITARY POINTS TO BE NOTED

1. Give special attention to safeguarding the source and distribution of the water-supply.

2. See that all night-soil, street sweepings and house refuse are regularly and completely removed.

3. See that all public and private latrines and cesspools are regularly cleaned by the sweepers in charge, and that the seats, pails, etc., are in good repair.

4. See that the night-soil is being efficiently and systematically trenched or incinerated.

5. Inspect all pail and refuse depots, see that drains are regularly cleaned, and that the deposits removed from drains are not allowed to remain and decompose by the sides of the drains; that all streets, lanes and compounds are regularly swept and properly watered.

6. See that the night-soil and refuse carts are in good repair, not leaking or allowing their contents to be scattered on the roads to the trenching grounds.

7. Report any avoidable accumulation of water that might serve as breeding-ground of mosquitoes.

8. Regularly inspect slaughter-houses, and the means for disposal of the offal.

9. Inspect meat, fruit and milk shops, bakeries, ice and aerated water factories, and report if grain foods are not being properly stored.

10. Especially in time of unusual mortality, make frequent visits to burning-ghats and cemeteries, and report if the dead are not being properly disposed of.

11. Take steps for the early removal and disposal of all dead animals.

12. Report the outbreak of any infectious disease, and, if possible, localize the source of infection, as cholera from certain wells, or plague from houses in which rats have been dying.

13. At once report any nuisance.

14. Report any defect in the construction of a house which might be a source of danger or nuisance to the public.

15. Report the existence of any "offensive trade".

16. See that the provisions of the Factory Act are carried out in all factories.

17. Know exactly the work of each daroga, jemadar, mate, bhistic and sweeper, so that when work is not efficiently performed, the person at fault can at once be detected.

18. Work on a definite system, and always carry a notebook, making your notes of any defect on the spot.

CHOLERA—INSTRUCTIONS FOR THE PREVENTION OF THE SPREAD OF, IN URBAN AREAS

A case of cholera under unhygienic conditions is a source of danger to its neighbours, and much can be done by early and suitable treatment of environment to prevent the extension of the malady. The following measures, whenever and so far as practicable in the local conditions obtaining, should be adopted forthwith on the occurrence of the first cases. Their general application, once the disease becomes epidemic, is almost impossible. The co-operation of the leading local residents should invariably be secured.

1. If possible, a sweeper should be told off to each house in which there is a patient suffering from cholera. He should be supplied with hycol or Cyllin solution of the strength of 1 to 100 and with some earthenware gamlas, preferably glazed.

The sweeper should remove and disinfect the dejecta and vomit of the patient, and should disinfect the floor and house latrine.

2. As soon as the patient dies or recovers, the floor, if pakka, and the walls and beds, should be washed down with the same solution. If the floor is kaccha, either (1) the earth should be removed to a depth of four inches, quicklime sprinkled on the ground, and four inches of fresh clean earth substituted, or (2) the floor should be thickly covered with quicklime, or covered with grass, which should be set alight.

3. Upon the death or recovery of the patient, all the clothes worn by him should, if possible, be boiled or disinfected, or if likely to be spoilt by boiling or disinfection, be exposed in the sun for eight hours. When necessary to overcome opposition, compensation may be paid and the clothes burnt. All rags and articles of no value, which have come into contact with the patient, should be burnt. The charpoy upon which the sufferer has been lying, as also any other furniture with which he has come into contact, should be also washed down with hycol or Cyllin solution.

4. Upon visiting the house in which a case of cholera has occurred, the officials should at once ascertain which latrine has been used by the sufferer; usually, it will be a latrine in the house. In this case, the sweeper should be sent for, and it should be ascertained to what filth depot or elsewhere the excreta have been removed. The receptacle and carts at such depot should at once be thoroughly washed out and disinfected with hycol or Cyllin and re-tarred.

The soil of the depot itself should also be dug to the depth of four inches, disinfected, removed and burnt or treated as in paragraph 2 above.

When a public latrine has been used, the entire latrine should be thoroughly washed down and treated with hycol or Cyllin and re-tarred.

5. The latrine in the house needs particular attention. It should be dealt with whether the sufferer is stated to have used it or not. The whole of the interior of the structure—floor, walls and ceiling—should be well washed down with hycol or Cyllin solution, and in addition, if the floors be kachcha, the earth, to the depth of four inches, must be removed, and fresh, clean earth substituted. The gamlas should also be thoroughly disinfected, broken up and buried. If the sufferer be dead, these measures will suffice; but if he be alive, the official should provide gamlas (preferably glazed), four inches in depth, for the latrine and sick room, and also furnish the house sweeper with hycol or Cyllin solution, and instruct him and the family to disinfect each stool before removal. The kachcha floor should be sprinkled thickly with quicklime or treated as in paragraph 2 above.

6. Almost every private latrine (and nearly every dwelling has a private latrine of some sort) has a drain, pakka or kachcha, communicating with a drain or cutting outside the house or hut. It can well be understood that it is highly dangerous for the washing from the latrine, which has been used by a patient with cholera to pass into the public surface drains in the crowded streets of a town or city. While the patient is still alive, and until death or recovery, all these drains should be disinfected daily, as, although the latrine may not be used by the sufferer, the residents of the house will probably throw foul matters into it.

7. A very large proportion of houses (and even huts) in a town have a private well in the compound. The water in the well, usually being "bitter" (from nitrates, nitrites and chlorides), is not often used for drinking purposes, except in an emergency, and the resident will usually say so, but it is used for washing plates and utensils and other purposes, and if it is contaminated, or likely to become so, it is distinctly dangerous. As the mouth of the well is usually flush, or nearly flush, with the ground, and as people bathe and wash clothes, etc., in its immediate vicinity, its pollution, sooner or later, is almost a matter of certainty. When a case of cholera has occurred, the well should be treated with an ounce of permanganate of potash and sufficient hydrochloric acid to cause the water slightly to redden litmus paper. It should then be closed for a month, or, if further cases occur in the same house, for a month after the recovery or death of the last case.

A useful measure, as tending to prevent the contamination of a public well, is the supply of water by the local authority to the inmates of an infected house.

8. A diffused and extensive outbreak should draw attention to the public water supply, and especially to the common use of a public well by those attached; a more localized outbreak, to the source of food supply; and an isolated case or cases, to the possibility of the introduction of disease from without. The procedure, in each case, is clearly indicated. A filtered supply should be analysed and suitably dealt with; a public well closed or disinfected. A bania's stock may have to be purchased and destroyed. But the last contingency will not often occur. In the majority of cases, it is believed, the origin of the disease will be found in the contamination of the water supply; very possibly, by an arrival from an infected area.

9. In small urban areas, in which the number of wells is limited and supervision is possible, all the wells, with the exception of one or two of the best, should be closed temporarily, with boards and sods. The wells left open should be permanganated, and for them Kahars (water-drawers) should be appointed. No person, except the Kahar appointed for this purpose, is permitted to draw water from these wells. The Kahar should be furnished with a new rope or one that has been well soaked in permanganate. At each end of the rope should be affixed an iron bucket or a kerosene oil tin. These tins and dols should never be removed from the well during the outbreak. The Kahars furnish water by pouring it into a hollow bamboo or tin purnalla, below one end of which is presented the water vessel which requires filling. This method is commonly known as the piau system. The services of the Kahars should be retained for six days after the occurrence of the last cholera case.

CHOLERA—INSTRUCTIONS FOR THE PREVENTION OF THE SPREAD OF, IN RURAL AREAS

1. The mukhia and the chaukidar are both equally responsible for at once reporting to the patwari the occurrence of any case of cholera or suspected cholera in their village or villages. If the patwari be absent from his circle, the chaukidar shall proceed at once to the thana to report. It is part of the mukhia's duties to see he does so.

2. The patwari, on receiving this information, or coming to know in any other manner of the suspected outbreak of cholera, shall at once give a written report of the circumstances to the chaukidar, who shall immediately take it to the thana. The officer, for the time being in charge of thana, shall at once send messages in green envelopes to the District Magistrate, the Civil Surgeon and the Tahsildar.

3. The District Magistrate shall, on receipt of the news, give immediate notice to the Civil Surgeon, as well as to the military authorities, the Magistrate of surrounding districts and to the Political Agents for neighbouring Indian States. The District Board shall be liable to meet from its allotments for district epidemic

charges, any expenditure incurred in consequence of such action from the deputation of assistant or sub-assistant surgeons to the district or other emergent measures.

4. On receipt of the information of a cholera case, the Civil Surgeon shall take immediate steps to depute vaccinators to proceed to the seat of the outbreak.

5. The Civil Surgeon shall send with them a supply of cholera pills, permanganate of potash and other necessary medicines.

6. The Civil Surgeon shall, when possible, visit the cholera infected village and advise the District Magistrate as to the staff required in the event of an epidemic occurring. He should inspect the work of the staff placed on cholera duty.

7. The distribution of 32 one-ounce packets of permanganate of potash or of 32 two-ounce bottles of bleaching powder shall be made, through the tahsildar, to each patwari.

8. Every tahsildar shall, in addition, be supplied with a reserve stock of 10 lb. of permanganate of potash or 20 lb. of bleach, made up in 10 separate packages, each containing either 16 one-ounce packages of permanganate of potash or 16 two-ounce bottles of bleaching powder, for issue to patwaris or vaccinators and to sub-assistant surgeons on special cholera duty.

9. Headquarter dispensaries will also maintain a reserve stock of 10 lb. of potassium permanganate or 20 lb. of bleach, packed in bottles, on which the tahsildar may indent in case of emergency, and on which the sub-assistant surgeons or vaccinators placed on special cholera duty shall also draw.

10. On the issue of any of these reserve stocks, the tahsildar shall indent on the Secretary, District Board, and the Medical Officer in charge of a dispensary on the Civil Surgeon, for the replacement of the amount expended.

11. Patwaris must be made to understand clearly that after sending information to the thana, as laid down in the first paragraph of these rules, they must proceed at once to the infected area and disinfect the wells with permanganate of potash or bleaching powder, and re-disinfect them every third day, till the epidemic has ceased or till relieved by the vaccinators.

12. (1) The District Magistrate should arrange for the distribution of pamphlets to all patwaris, containing information as to the method of avoiding infection from cholera.

The patwari should be ordered to acquaint the villagers with the contents of the pamphlet. Leaflets explaining the method of disinfecting wells should also be distributed to patwaris.

(2) If the epidemic threatens to become serious in a defined area, the Magistrate should, at his discretion, apply to the Inspector-General of Civil Hospitals for the services of a sub-assistant surgeon.

(3) In case of a severe epidemic within a fairly defined area, application should be made by the Magistrate to the Commissioner for sanction to depute a tahsildar or naib tahsildar on special cholera duty.

13. If the epidemic does not rapidly subside, the Civil Surgeon should, when necessary, direct the nearest travelling dispensary in his own district to move at once to the infected area, reporting the fact that he has done so as a temporary measure to the supervising medical officer of travelling dispensaries. If further assistance is required, the Director of Public Health may be consulted with regard to the transfer of travelling dispensaries from adjoining districts.

CARRIERS

It is known that several of the organisms of acute infective diseases, such as diphtheria, typhoid fever, etc., may grow on the mucous membranes of persons in apparent health; such individuals are known as "carriers" and are divided into two groups:

Group I consists of those who have suffered from the disease, and the organisms have persisted after recovery. The proportion of those who become carriers and the period of harbouring the organisms vary in different disease, for example, the period in cholera is comparatively short, whereas in typhoid it may be indefinite.

Group II comprises individuals who harbour the organism, but without evidence of having suffered from the disease, some of these persons may subsequently develop the disease; The individuals may be "contacts" or "non-contacts." The organisms which are usually carried are those of diphtheria, typhoid including the paratyphoid groups and cholera, the meningococcus and the amoebae of dysentery.

Generally speaking chronic carriers have a local abnormality either anatomical or due to infection with other bacteria, which favours the persistence of the specific organisms.

The majority of typhoid carriers are women and such persons are a constant danger to the community, especially in the preparation of food. To track down a typhoid carrier is often an important, but difficult problem. In the first place the serum of all suspected persons should be subjected to the Widal test, but the proof lies in the isolation of the bacillus from the faeces or urine.

DISINFECTION

There is a popular belief that disinfection is a substitute for cleanliness. One of the greatest obstacles to successful chemical disinfection is dirt, which uses up the disinfectant before it can kill the micro-organisms sheltered by it. Therefore the removal of all dust, liberal washing with soap, hot water, and soda should always be carried out as a preliminary.

Briefly, the following are the chief methods of disinfection. There are still very few modern disinfectors in even the larger Indian cities, so it is obviously useless to recommend disinfection by steam to a village community, and we must rely mainly on Nature's disinfectants, the sun and air.

1. HEAT

(a) FIRE.—This is, of course, the most thorough means of disinfection. Rags and old linen should be used to receive infectious discharges, and these should be soaked with kerosene to ensure complete destruction.

(b) BOILING.—This is one of the best methods, and very few even of the spore-bearing organisms can stand boiling for a few minutes. It is readily carried out in any village by means of a Karahi over a chula.

(c) HOT AIR.—This is not practical in India, and is far from reliable.

(d) STEAM.—This is used in various types of apparatus:

- (1) Stoves, in which steam at temperature of 100° C., without pressure is used; cheap, but less efficient.
- (2) Those in which steam at low pressure, 2, 3, or 5 lb. per square inch, is used. Temperature 100° C.; cheaper and less efficient than No. 3.
- (3) Steam at a pressure of 10 lb. and over to the square inch. Temperature 115° – 120° C. By the higher pressure of steam and the more rapid penetration, less time is required in disinfection—quarter to half an hour.

The steam, which must be free from air, may be current or confined. Current steam serves to drive the air out of the interstices of fabrics, and thus to aid penetration, but since more steam is used, more fuel is consumed.

The steam employed may be saturated or superheated, the former being far preferable, owing to its more rapid and thorough penetration. Superheated steam involves a longer exposure in the chamber, a greater expenditure of fuel, and greater liability to injury of the articles.

A portable disinfectant which could be used for village work is Professor Lelean's steam-sack disinfectant.

In the towns where large steam disinfecting chambers are available, much trouble has been caused by the making of inventories and *claims for loss*; this is obviated by issuing large canvas bags similar to a soiled linen bag, but much larger. These have a chain threaded through eyelets with a padlock; the bags are issued to the person whose clothing, etc., has to be disinfected; he packs and locks the bag, retaining the key. On return of the bag from the disinfecting station the owner unpacks his bag.

2. CHEMICAL DISINFECTANTS

(a) GASEOUS DISINFECTANTS.—Formaldehyde is the most practical and efficient. It may be generated by pouring formalin on to

potassium permanganate in an ordinary bucket, in the proportion of 10 oz. of potassium permanganate to 1 pint of formalin for every 2,000 cubic feet of space. The disinfection should be for six hours.

Sulphur dioxide by (a) Pot method, or (b) Furnace (Clayton).

(b) LIQUID DISINFECTANTS.—

- (1) *Perchloride of mercury* (corrosive sublimate): very powerful and cheap.
- (2) *Saponified cresol*: cheaper, more efficient, and less poisonous than carbolic acid.
- (3) *Formalin*, 1% solution: rapid, reliable, and fairly cheap.
- (4) *Izal*, 5% solution: very efficient; especially recommended for the disinfection of rooms in which patients with tuberculosis of the lung have been living, for which a solution of 1 in 100 should be used.
- (5) *Phenyle* very popular, but comparatively feeble.
- (6) *Cyllin* cheaper and more powerful disinfectant; strength, 1 or 2 oz. to the gallon of water.

(c) SOLID DISINFECTANTS.—

- (1) *Lime* must be freshly burnt; it is a cheap and useful disinfectant, but if stored for any length of time, it becomes useless, as by the action of the air a large part is converted into chalk.

It has been found that ordinary white-washing destroys all micro-organisms, except tubercle and anthrax. On account of the unfortunate and extremely insanitary Indian habit of spitting on to the walls of living-rooms, the surface of the walls should be well scraped before applying the white-wash.

- (2) *Chloride of lime* (bleaching powder): consists of lime saturated with chlorine; it is a powerful deodorant and disinfectant.
- (3) *Potassium permanganate*: generally used too weak, but in a 5% solution is a powerful disinfectant; is much used for the disinfecting of wells during cholera epidemics.
- (4) *Soap* is a powerful disinfecting agent in that it removes greasy substances, which protect bacteria from the action of sunlight and oxygen.

DISINFECTION OF EXCRETA AND DISCHARGES

- (1) Typhoid: urine and motions.
- (2) Cholera: vomit and motions.
- (3) Phthisis:
- (4) Lobar Pneumonia: } sputum.
- (5) Plague Pneumonia: }
- (6) Diphtheria, Cerebrospinal Meningitis and Measles: Discharges from the nose, throat and ears.

Any of the above disinfectants may be used, preferably Izal, 5%. The whole should be well mixed, and allowed to stand one to

three hours, and then burnt, or buried well away from any water supply.

Cholera dejecta may be mixed with equal parts of quicklime and water, the slake so formed being diluted with three times as much water, and allowed to stand for one hour.

Typhoid Bacilluria: formalin, 1%, is very effective.

3. SUNLIGHT AND AIR

These are powerful natural disinfectants, and will kill most organisms. All germs are attenuated, and finally killed, by drying. The typhoid bacillus is destroyed in from one and a half to two hours, and the diphtheria bacillus in half to one hour's exposure to direct sunlight. All bedding and clothing should be frequently exposed to the sun and air.

Colonel Cunningham (I.M.S.), of the Bombay Bacteriological Laboratory, has devised the following valuable method for the treatment of clothing and bedding, which can be used in any village, with no expenditure of money, and but little labour, at practically any season of the year:

- (1) Choose a smooth, sandy place where no grass or bushes grow, and which is fully exposed to the sun. It must not be near trees or houses, and the ground should have no cracks in it and be free from stones.
- (2) If the place is not sandy by nature, it must be covered with a layer of sand three inches deep, and made quite smooth on the top.
- (3) The sand must be very hot before the clothes are put on it. It is necessary, therefore, to wait till about 10 a.m. before spreading the clothes, and no clothes should be spread after 4 p.m., as the sand will not be sufficiently hot at that hour.
- (4) The clothes should be spread evenly on the sand, in a single layer, and allowed to remain in the sun for a period of one hour.
- (5) Thick and padded clothes, such as rezais and quilted coats, must be turned over once or twice, in order to expose both surfaces to the sun.
- (6) Clothes must not be placed within three feet of the edge of the sand; otherwise, some fleas may escape, and ultimately reach the village.
- (7) The sandy surface must be quite smooth, and precautions should be taken to prevent cattle straying across the prepared surface, prior to the commencement of operations.

FOOD INSPECTION

INSPECTION OF ANIMALS BEFORE SLAUGHTER

	<i>Indications of Health</i>	<i>Indications of Disease</i>
Skin	Smooth and glossy	Harsh and the hair standing on end.
Eyes	Bright and clear	Heavy and injected.
Tongue	Clean, not protruding	Furred and hanging out of the mouth.

INSPECTION OF ANIMALS BEFORE SLAUGHTER—*continued*

	<i>Indications of Health</i>	<i>Indications of Disease</i>
Nostrils	Bright red and moist	Dry and covered with frothy or yellow secretion.
Breath	Sweet	Foul.
Respiration	Regular and easy	Laboured.
Excreta	Normal	Diarrhoea, urine scanty or bloody.
Temperature	Normal	The ears, feet, and teats are hot.
Movements	Quick	Slow and difficult.

The principal infectious diseases are pleuro-pneumonia, tuberculosis, anthrax, foot-and-mouth disease, cattle plague, and actinomycosis.

The important point in tuberculosis is to determine whether an organ or glands only are affected, or whether there is a generalized tuberculosis, i.e., spread of tubercle bacilli by the blood-stream or thoracic duct.

The age of an animal can be approximately determined from its teeth and the rings on the horns.

MEAT.—In good meat the flesh is firm and yet elastic; it has a marbled appearance from the ramifications of little veins of fat among the muscles; in the intermuscular cellular tissue, there should be no softening or mucilage-like fluid.

A deep-purple tint is said to indicate that the animal has not been slaughtered, but has died with the blood in it. There should be no lividity on cutting across the muscles, and a little reddish juice should exude after some hours.

GOAT'S MEAT.—The meat of an old goat is dark, harsh and strong, with a peculiar goaty smell. The shanks of the fore and hind legs are very thin, ribs white, and the outer coating of the animal deep red. Neck very thin in she-goats and very thick in he-goats.

BUFFALO MEAT.—This is darker and more reddish-brown than beef, with a bluish look and coarse grain.

The following *parasites* may be conveyed to man by eating meat

- (1) *Trichina spiralis*;
- (2) *Cysticercus cellulosae*;
- (3) *Cysticercus bovis*.

FISH—Fish, when fresh, is firm and stiff; the tail should not droop, the scales should not be dull, damaged or easily detached. An infallible test of unsoundness is when, with strong pressure of the thumb and fingers above and below, the deeper flesh readily crushes, leaving the skin only between the fingers.

MILK.—Placed in a narrow glass, good milk should be quite opaque, of a full white colour, and without deposit, peculiar smell or taste. When hoiled, it should not change in appearance. Milk adulterated with water, when placed in a white vessel, shows a blue line at the junction of the milk and the vessel.

It is a difficult matter to obtain milk that is reasonably free from bacterial contamination, as during milking so much contamination comes from the udders and flanks of the cow and, unless every precaution is taken, from the hands of the milkers and from the vessels in which the milk is stored. Milk is an ideal medium for the growth of pathogenic and other bacteria. All milk in the tropics should as a rule be boiled.

Milk-borne diseases have been classified by Kirk as:

<i>Common to cattle and man.</i>	<i>Not affecting cattle, but spread by milk contaminated from human sources.</i>
Bovine Tuberculosis	Typhoid and Paratyphoid fevers
Undulant Fever	Diphtheria
Foot-and-Mouth Disease	Scarlet Fever
Milk Sickness.	Septic sore throat.

GHEE.—Ghee is most commonly prepared from buffalo milk. Cow's-milk ghee has a slight yellow tinge, good ghee should be clear, white, and solid (in the cold weather), with a faint agreeable odour. Unfortunately, ghee is much adulterated. The principal adulterants are groundnut, coconut, mohera, castor and poppy-seed oils, animal fat, boiled potatoes and plantains.

ATTA.—Good atta should be silky to the touch and free from grit. It should be free from any smell or odour suggestive of acidity or mouldiness.

FOOD PRESERVATIVES

Whereas these are regarded with suspicion, it is generally agreed that if not used indiscriminately and to enable the sale of unsound food, no harm is likely to result from the following in small quantities.

Borax.	Salicylic acid.
Boric acid.	Sulphites.
Benzoic acid.	

The following should *not* be used:

Formaldehyde. Fluorides. Silicofluorides.

FOOD POISONING

This is produced by the Gaertner group of bacilli, either by the organisms or their toxins; the symptoms of cramp, collapse, and purging may be mistaken for cholera.

WATER, PURIFICATION OF

1. DISINFECTION OF A MUNICIPAL WATER SUPPLY

Rules under the Municipalities Act

The instructions for the disinfection of a municipal water supply on the occurrence of an epidemic of typhoid fever or cholera, drawn up by the Superintending Engineer, Public Health Department, U.P., for the guidance of the boards, are given below.

On the occurrence of an epidemic of typhoid fever or cholera, which is proved to be in any way traceable to the water supplied

from municipal water-works, the engineer in charge, on receipt of orders from the Superintending Engineer, Public Health Department, shall at once proceed to disinfect clear-water reservoirs and distribution pipes in the manner described below.

The depth in one compartment of the clear-water reservoir should be lowered until only 20,000 gallons of water are left in the reservoir. Ten pounds (avoirdupois weight) of permanganate of potash (previously dissolved in buckets or in an iron tank) should then be added gradually at about six or seven o'clock in the evening. At 11 p.m., by which time the demand for drinking purposes will have ceased, the pumps should be started and the pink water slowly pumped through the distribution system. Where there is a raised reservoir, this should be emptied by opening some of the scour valves before pumping is commenced, so that the disinfectant may thoroughly wash out the reservoir as well as the pipes.

Arrangements should be made, while the pumping is in progress, to have all the scour valves opened in rotation, to ensure a proper circulation of the disinfecting fluid.

When the reservoir has been pumped empty, the supply from the filters should be turned on, and as soon as sufficient water has collected, the pumps should be re-started and clear water pumped slowly through the system for half an hour.

By starting pumping at 11 p.m., it should be possible to have the whole operation completed by three or four o'clock in the morning, before water is required for domestic purposes.

The above procedure is to be observed in the case of an outbreak of typhoid, the only difference, in the event of the epidemic being one of cholera, is that 10 gallons of commercial hydrochloric acid should be added to the solution of permanganate of potash in the clear-water reservoir. The hydrochloric acid should, of course, be previously diluted in bucketfuls of water, before being put in the reservoir.

2. DISINFECTANTS FOR WATER SUPPLIES

Rules under the Municipalities Act

(a) **PERMANGANATE OF POTASH** should be used in the disinfection of wells in a strength of 0.5 gr. per gallon, that is to say, a sufficient quantity should be added to give a perceptible pink colour, remaining visible for at least six hours. For ordinary wells, five feet in diameter and containing six feet of water, one ounce should be dissolved in a bucketful of water, before adding it to the well to be disinfected; the water in the well should be agitated by the bucket after the addition of the solution.

(b) **BLEACHING POWDER** (chloride of lime) is issued in small sealed tins covered with paraffin wax, or in bottles. When freshly received from the manufacturers, a 2 oz. tin or bottle is sufficient for a well five feet in diameter containing six feet of water, but, as the strength of the contained chlorine rapidly diminishes, for thorough disinfection in most cases two tins will be required, as also when the well is larger than five feet in diameter.

The formula for calculating the amount of chloride of lime or potassium permanganate necessary to disinfect a well is :

$$2 \times (\text{diameter of well in feet}) \times (\text{depth of water in well in feet}) = \text{number of pounds of chloride of lime required.}$$

The amount, divided by 10, will give approximately the number of ounces of potassium permanganate required.

The experience of the War has been that, when working with considerable volumes of water, the choice of a reagent is practically limited to free chlorine, supplied either from cylinders of the liquefied gas, solutions of sodium hypochlorite of known concentration, or bleaching powder (chloride of lime). The action of all these is essentially similar, and their usefulness depends upon the fact that the presence of about 0.5-1 part of active chlorine per million parts of water, for a short time, results in complete sterilization, as regards the coliform group of organisms.

Sodium hypochlorite solution is preferable to bleaching powder, in that it is more readily distributed through the water, but its varying composition and instability make it less satisfactory for field or famine use. For the sterilization of moderate quantities of water, such as those contained in a water-cart (110 gallons), bleaching powder has given very satisfactory results. Success with the use of chlorine depends upon adequate mixing, effective concentration, and avoidance of excess.

3. DISINFECTION OF WATER ON A SMALL SCALE

(1) ALUM: 6 gr. to the gallon, removes suspended matter; it is very effective if calcium carbonate is present in the water. This method is much used in China.

(2) POTASSIUM PERMANGANATE: Has its value as an oxidizing agent and germicide. One and a half grains should be used for each gallon of water.

(3) QUICKLIME: The amount should be two ounces for every gallon of water.

(4) FREE IODINE: Liberated by Nesfield's sterilizing powders. Each packet contains three powders—A, B and C. Dissolve A and B powders in 2 chittaks of water, pour the resulting brown liquid into a bucket of water and stir. Now pour the contents of the bucket into the well, and mix thoroughly by elevating and lowering the bucket. Wait at least an hour, then dissolve C powder in a bucket of water, and mix well with rest of the water in the well as before. The water is now ready to drink. The advantages of this method are rapidity, simplicity, and the fact that the taste and appearance of the water are not changed. Typhoid and cholera organisms are killed in a few minutes. These powders can be purchased in all sizes, to sterilize a whisky bottleful of water up to the contents of a large well.

There are three processes by which water can be sterilized in either small or large quantities.

- (1) **CHLORINATION.**—A water free from suspended matter can be sterilized, especially as regards organisms of intestinal origin, and the method is very effective in controlling epidemics of enteric. Bleaching powder is convenient to use and the former difficulty of the rapid deterioration in tropical countries by the absorption of moisture has been overcome by the addition of 20% of quicklime. This mixture, after several months' storage in India, shows little loss of chlorine content.
- (2) **OZONIZATION.**—The ozone is generated by electrical plant; the process is expensive and complicated.
- (3) **ULTRA-VIOLET RAYS.**—These are generated by a mercury-vapour lamp. It is most effective, typhoid bacilli being killed in less than 20 seconds and cholera vibrios in 15 seconds. The water must be clear and free from suspended matter. It has the advantage over the above methods in that nothing is added to the water, and if the bacterial content is known, the time of exposure to the rays can be so adjusted as to effect complete sterilization.

DISEASES PRODUCED BY WATER

- (1) **ENTERIC FEVER.**—One patient may infect enormous supplies.
- (2) **PARATYPHOID, A, B, and C.**—Results especially from polluted bathing water.
- (3) **CHOLERA.**—Water is the most frequent, but not the only source of infection.
- (4) **DYSENTERY.**
- (5) **ENTOZOA.**—Water is the chief means of conveying the majority of helminthic infections, including roundworm and threadworm.
- (6) **DYSPEPSIA AND DIARRHOEA.**—Result from water with high permanent hardness or suspended clay, sand or mica.
- (7) **GOITRE.**—McCarrison has shown that endemic goitre is due to the action on the thyroid, of a toxin, the product of an intestinal microbic infection, together with lack of iodine.
- (8) **METALLIC POISONING.**—By lead, zinc, arsenic, copper. The source is usually from pipes or storage receptacles, but may be pollution from trade processes or mines. As small an amount as $\frac{1}{16}$ gr. per gallon of lead will produce definite symptoms in persons with an idiosyncrasy to that metal.

METHOD OF COLLECTING SAMPLES OF WATER FOR CHEMICAL AND BACTERIOLOGICAL EXAMINATION

For chemical examination about half a gallon should be sent in a stoppered Winchester bottle, which has been cleansed with strong acid and then well washed; it should be rinsed twice with the water for examination before the actual sample is taken.

For bacteriological examination two ounces should be collected in a glass-stoppered bottle sterilized at 100° C., care being taken that the part of the stopper inserted into the bottle does not touch the hand.

OPINION UPON A WATER SAMPLE

Both bacteriological examination and chemical analysis should always be made, but it must be remembered that the results of a water taken at source and after traversing a long pipe line may show marked differences.

CHEMICAL ANALYSIS.—This frequently shows pollution and danger, but is not always reliable as to absolute purity and safety. As a rule when an excess of organic matter in a sample of water is accompanied by oxidized nitrogen, ammonia and a large amount of chlorine, contamination is from sewage. Also, while it shows the presence and amount of organic matter, it cannot determine the quality or differentiate between living and disease-producing organisms and dead and innocuous matter.

BACTERIOLOGICAL EXAMINATION.—A large or small number of non-pathogenic bacteria or fungi in a sample of water shows a large or small amount of organic pollution, but the isolation of specific organisms of, say, typhoid, from this great number of harmless species, is a matter of difficulty. The detection, however, of intestinal bacteria, such as *B. coli*, at once points to the nature of the pollution. Dunn and Pandia state that "there is no doubt that the bacterial flora of waters in India are different from the waters of more temperate climates, and the relative amount of the different classes of organism varies considerably. It is therefore necessary that a bacterial standard of purity for water in India be established. At present it may be stated that pure water after filtration should not contain on an average more than 10-20 colonies per c.c. that grow on agar at 37° C. and absence of fermentation in McConkey's medium in 40 c.c. of water."

Clemesha (*The Bacteriology of Surface Waters in the Tropics*) did valuable work on this subject and showed that the sun has a very powerful action in destroying all faecal organisms in water.

AIR SPACE AND VENTILATION

1. Every sick person should have a floor space of 100-120 square feet and a cubic space of 1,500-2,000 cubic feet. The floor space in no circumstances should be less than one-twelfth the cubic space.

2. Schools should have a minimum of 20 square feet of floor space and 200-300 cubic feet of air space per pupil, and dormitories a minimum of 500 cubic feet per head. All classes, whenever possible, should be held in the open air, under a tree, except during the rains.

3. In factories and workshops, a minimum of 500 cubic feet per worker, and if injurious gases or dust are produced, the cubic space should be greater and artificial ventilation provided to remove them.

4. Every healthy person should have at least 800 cubic feet of air space.

5. For cattle and horses, a floor space of 100-120 square feet, giving a space of 1,200-1,800 cubic feet, is sufficient if ventilation is

free, as the air can be changed more rapidly than in human habitations.

6. With this space, efficient ventilation must be provided, in order to keep the air pure; 3,000 cubic feet per head per hour must be supplied. If the air in a room is changed by ventilation more than three or four times in an hour in cold weather, an unbearable draught is created.

7. Fresh air should be admitted at a low level, and foul air discharged at the ceiling level, the natural ascent of air being rapid on account of its temperature.

8. The area of inlets should be one square inch for each 60 cubic feet in the contents of the room.

9. The area of outlets should be one square inch for each 60 cubic feet contents for a room on the ground floor, one square inch per 55 cubic feet on the next floor, and one square inch per 50 cubic feet on the top floor.

10. The inflow of air must be properly diffused, and not permitted to pass direct from the inlets to the outlets.

As regards systems of ventilation there is the Vacuum System; this is effected by an extractor fan revolving rapidly near the ceiling, thus removing the vitiated air; the incoming air, which is untreated, pours in to fill the partial vacuum from low-placed inlets.

By the Plenum System air is driven in by a powerful fan and allowed to find the various outlets, the windows and doors being kept closed. This method has the advantage that the incoming air can be purified, its humidity increased or diminished, and it can be either cooled or heated.

The third method is known as the Balance System and is a combination of the Vacuum and Plenum Systems, and is the best system for hospitals, cinemas, theatres, factories and large public buildings, the occupants being given a pure air of equitable temperature and humidity. The air is cooled by passage through tatties, and excess of humidity removed by passing through calcium chloride. Such a system is naturally of enormous advantage to health and comfort. The degree of humidity is important when the temperature of the external air is between 82° and 92° F.; lowering the temperature 10 degrees will be sufficient if the humidity is reduced. But in Northern India in the hot weather with the external temperature between 105° and 120° F. and low humidity, the temperature could be reduced to, say, 85° F.

ARTIFICIAL ILLUMINATION

The chief sources of light are cheap kerosene oils which are impure and give off large amounts of unburnt carbon as soot, and also mustard oil, but fortunately the use of electricity is becoming more general with the advantage that the air is not vitiated by the burning of oxygen, and the production of moisture and CO₂ with the added discomfort of heat. The following table shows vitiation of the atmosphere from different sources of light as compared with the vitiation from persons:

Source of light	Vitiation equal to adults
Tallow candle	12 0
Kerosene oil lamp	7 0
Electric incandescent light	0 0

For heating purposes radiant heat is the healthiest, and wood fires are used when necessary.

Note.—The above figures for ventilation must of course be adapted to the wide range of climatic conditions existing in different parts of India; also to the climates of hill and plain.

STANDARD OF SANITARY CONVENIENCES AND STAFF RECOMMENDED

LATRINES.—One seat per 70 of population, and for a latrine of 48 seats, one male and one female sweeper should be employed.

URINALS.—One per 500 of population. No separate staff is necessary.

RUBBISH CARTS.—One per 1,500 of population. One driver per cart.

SLAUGHTER HOUSE.—One sweeper, one bhistic, one cart driver.

STREET AND LANE CLEANING.—This will vary as to whether the area is sparsely or thickly populated, and as to whether the road has side drains or not. One sweeper can do from 20,000–50,000 square feet of road surface and 2,000 feet of side drain.

There should be one Jamadar for every 25 sweepers.

In **UNSEWERED** towns, one night-soil cart (single) to every 2,500 population. On trenching ground, one beldar for two single or one double cart.

TRENCHING GROUND.—This should be from $\frac{1}{2}$ –1 mile from the town on the leeward side; this is on account of the fly nuisance. The area should be sufficient for three years' trenching, divided into three equal plots. There should be a road down the centre of the ground, with the trenches dug at right angles, parallel to one another, and 18 inches apart. The trenches must be 2 feet broad, 1 foot deep, and the length adapted to the shape of the trenching ground. The night-soil is poured in to a depth of 3 inches and the earth then covered in.

USEFUL DATA

THERMOMETERS

The *thermometric scales* chiefly in use are those of Fahrenheit, Celsius (Centigrade), and Réaumur. The Réaumur scale is now but rarely used, Fahrenheit is usually employed clinically, and Centigrade in chemistry and research work.

The following are the freezing and boiling points of the three scales:

Freezing Point	32° F., 0° C. and 0° R.
Boiling Point	212° F., 100° C. and 80° R.

To convert degrees F. into degrees C., deduct 32, multiply by 5 and divide by 9.

To convert degrees C. into degrees F., multiply by 9, divide by 5 and add 32.

BAROMETER

Atmospheric Pressure = 760 mm. of mercury;
 = 29.22 inches of mercury;
 = 33.9 feet of water;
 = 14.71 lb. to the square inch.

The barometer falls one inch for every 900 feet of ascent above sea-level—less at great heights.

The Velocity of Light = 186,000 miles per second.

The Velocity of Sound = 1,130 feet per second.

Horse Power equals 33,000 foot pounds of work per minute.

ELECTRICITY

No one knows what electricity is. The following is an interesting classification by Sir Oliver Lodge:

- (1) Electricity at rest, or static electricity, which refers to all phenomena of stresses and strains.
- (2) Electricity in locomotion or current electricity, the phenomena set up in metallic conductors, etc., by the passage of electricity through them.
- (3) Electricity in rotation or magnetism.
- (4) Electricity in vibration or radiation, the phenomena of ether waves, including those we know as "light".

ELECTRICAL MEASURES

VOLT = The unit of pressure
 = Electromotive force
 = About 92.6% of that given by one Daniell's battery cell.

OHM = The unit of resistance
 = The resistance offered to the passage of a current of electricity by a column of mercury 106 cm. long by 1 mm. diameter, at the temperature of melting ice.

AMPERE = The unit of current
 = The current 1 volt will drive through 1 ohm.

WATT = The unit of power
 = 44 foot-pounds per minute.
 Volts 12 = Ampere 4 \times Ohms 3 = 12.

$$\text{Ampere } 4 = \frac{\text{Volts } 12}{\text{Ohm } 3} = 4.$$

$$\text{Ohm } 3 = \frac{\text{Volts } 12}{\text{Ampere } 4} = 3.$$

If an ampere-hour be multiplied by the pressure (volts) then we have the consumption of electrical energy in watt-hours, one

thousand of which are called a Board of Trade Unit or one Kilo-watt for one hour or $1\frac{1}{2}$ H.P. A Board of Trade Unit (B.T.U.) will keep a 16-candle incandescent lamp alight for about sixteen hours.

RAINFALL

1 inch of rain = 4.673 gallons per square yard;
 = 22,617 gallons per acre;
 = 100 tons 9 cwt of water per acre.

One ton of water contains 35.9 cubic feet.

DRAINAGE

To find the fall at which drainage pipes of varying sizes should be laid, multiply the inside diameter of the pipe by 10; the result will be the number of feet in which the drain should fall one foot. Example: 6 in. diameter = 1 in 60.

CIVIL HEALTH ADMINISTRATION IN BRITISH INDIA

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THE PRESENT STATE OF THE PUBLIC HEALTH

India is a sub-continent comprising an area of 1,581,410 square miles and a population of about 389 millions at the 1941 census. Between 1872 and 1941 its population has grown by about 54%, while the corresponding percentages of increase in the United Kingdom and in Japan were 56 and 136 respectively. In the last two countries an important factor influencing the growth of population has been the successful control of mortality, whereas in India, though there has been a noticeable fall in the death rate during the same period the decrease has been less marked. In the United Kingdom there was, at the same time, a greater decline in the birth rate than in Japan, so that the proportionate increase of population became much smaller. In India, on the other hand, growth of population has taken place through the wasteful method of high birth and high death rates. The latter indicates also an undue prevalence of morbidity in the community. As will be seen from the following figures* her general and infantile mortality rates compare unfavourably with those of the other countries given below:

	General death rate per 1,000 of the population	Infantile death rate per 1,000 live births
1. British India ..	24.1 (1944)	169 (1944)
2. England and Wales ..	11.9 (1944)	46 (1944)
3. Australia ..	11.2 (1943)	36 (1943)
4. The United States ..	10.6 (1944)	40 (1944)
5. New Zealand ..	9.9 (1944)	30 (1944)

The high rates of morbidity and mortality existing in the community are due largely to the wide prevalence of many diseases

*Many of the figures quoted here are taken from the *Report of the Health Survey and Development Committee* appointed by the Government of India. It was published in March, 1946

which, because they have been effectively controlled in the temperate regions of the globe, are now commonly labelled tropical diseases. Competent observers estimate that at least 100 million individuals (or one in four of the inhabitants of the country) suffer from malaria every year while cholera, smallpox and plague also occur year after year and affect wide tracts of territory during their usual periods of prevalence. At the same time other diseases such as tuberculosis and venereal diseases, which exist in all parts of the world, are not absent in India. As regards the first, a conservative estimate places the number of active cases at about 2.5 millions in India as a whole and the annual mortality from the disease at 0.5 million. No reasonably correct estimate of the prevalence of venereal diseases is possible but one Director General of the Indian Medical Service considered that the proportion affected would be at least 37 per 1,000 of the population. Bowel diseases, such as the dysenteries, enteric fevers and diarrhoea, are also widely prevalent. The following figures give the average annual mortality from certain causes of death in British India during 1932-41:

Cholera	Smallpox	Plague	Fevers	Dysentery and diarrhoea	Respiratory diseases	Other causes	Total
144,924 (2.4)	69,474 (1.1)	30,912 (0.5)	3,633,869 (58.4)	261,924 (4.2)	471,802 (7.6)	1,599,490 (25.8)	6,201,434 (100.0)

The agencies for the registration of vital statistics and for determining the cause of death are far from satisfactory, and hence, health authorities have been publishing mortality statistics mainly in such broad groups as "fevers" and respiratory diseases.

The existing low level of public health is largely the result of failure, in the past, to organize community life in such a manner as to provide the conditions necessary for healthful living as well as to develop health services on a scale adequate to meet the needs of the people. Sound hygienic housing, good food in sufficient quantity, safe water and provision for recreation and for the wise use of leisure are all essential if the individual and the community are to lead healthy lives. Inadequacy of provision in all these respects has been an important cause in the maintenance of the public health of India at the present level. In the following paragraphs brief reference is made to the more important of these factors which are responsible for the prevailing high rate of sickness in the country.

A recent survey of health conditions in India has been made by a Committee appointed by the Government of India, the Health Survey and Development Committee over which Sir Joseph Bhore presided. In its review of housing conditions the Committee stated: "Existing housing conditions are, generally speaking, extremely unsatisfactory in rural and urban areas. The growth of housing accommodation in the country has not kept pace with the increase in population and overcrowding is therefore a common feature, particularly in the towns and cities. In addition, the requirements of sound hygienic construction have largely been neglected, while

the state of insanitation that exists in towns and in the countryside helps to reduce still further the value of the home as the place which should provide reasonably satisfactory living conditions for the maintenance of the health of its inmates." In urban areas, particularly in industrial centres, overcrowding of a high degree exists. Two examples may be quoted. In Madura City in Madras Presidency a recent housing survey revealed that a large number of one-roomed tenements harboured 10 to 15 families in each, while in Coimbatore, for an increase of 170% in the population during the past half a century growth in housing accommodation was only to the extent of 20%. In other industrial areas such as Cawnpore, Ahmedabad and Bombay overcrowding exists to a marked degree.

A *well-balanced diet* which is adequate in quantity is essential for the maintenance of health and for the promotion of a sense of well-being. In India, where about 80% to 90% of the food consumed by the people consists of cereals, the average annual production of these important articles of food falls short of the country's requirements to the extent of 20% to 25%. Other articles of diet which are necessary for a balanced diet, e.g., vegetables, fruits, meat, fish and eggs, are produced in much smaller quantities and, until their production can be increased several times, the provision of a properly balanced diet for the people as a whole will not be possible. Dr. Aykroyd, who was till recently the Director of the Nutrition Research Laboratories, Coonoor, has pointed out that an inadequate and ill-balanced diet is typical of the food consumed by millions in India.

The percentage of population, urban and rural, served by *protected water supplies* is small (under 10) in the different provinces. The position is much worse in rural areas than in towns. Even in the latter the supplies are often intermittent while the quantity provided per head per day varies from 2 to 25 gallons. In Western countries it is generally considered essential to provide 25 gallons per head of the population for domestic purposes alone, and the requirements of large industrial cities are placed at a much larger figure. In certain parts of the rural areas water supply even for drinking and domestic purposes is scarce, and in some parts of the year people have to travel long distances before they can secure potable water.

Existing provision for *medical relief* is definitely low in comparison with the more progressive countries of the West, as may be seen from the figures given below:

	Number of doctors per 10,000 of the population	Number of beds per 1,000 of the population	Death rate per 1,000 of the population
U.S.A.	13.0	10.48	10.6
England and Wales	10.0	7.14	11.9
British India	1.6	0.24	24.1

About 70% to 75% of the doctors available in India are practising

in urban areas while the rural population is about eight to nine times larger than that of the urban.

Some idea of the inadequacy of medical provision in rural areas may be obtained from the fact that a rural population of 105,626 served by one institution in the United Provinces is distributed over about 224 villages.

A practical scheme for remedying this state of affairs will be found in the "Simeons Plan" given at the end of this article.

HEALTH ORGANIZATION IN BRITISH INDIA

The main health functions are the responsibility of Provincial Governments, while the Government of India is chiefly concerned with India's international health relations and with the administration of health in certain territories which are directly under the control of the Central Government, namely, Delhi Province, Coorg, Ajmer-Merwara and Baluchistan. These are known as the Centrally Administered Areas. The main subjects which have a bearing on health and in respect of which the Centre has legislative and executive powers are given below:

- (1) federal agencies and institutes for research, for professional or technical training or for the promotion of special studies where the research, training or special studies are related to medicine or public health;
- (2) the medical profession and other professions whose activities are related to medical relief and public health, e.g., the nursing profession, the pharmaceutical profession, the profession of dentistry;
- (3) port quarantine; seamen's and marine hospitals and hospitals connected with port quarantine;
- (4) maritime shipping and navigation, including shipping and navigation on tidal waters; Admiralty jurisdiction;
- (5) major ports, that is to say, the declaration and delimitation of such ports, and the constitution and powers of Port Authorities therein;
- (6) aircraft and air navigation; the provision of aerodromes;
- (7) carriage of passengers and goods by sea or by air;
- (8) opium, so far as regards cultivation and manufacture, or sale for export;
- (9) regulation of labour and safety in mines and oilfields;
- (10) admission into and emigration from India; pilgrimages to places beyond India;
- (11) migration within India from or into a Governor's Province or a Chief Commissioner's Province; and
- (12) census.

There are a number of subjects in which both the Centre and the Provinces have concurrent powers of legislation. This list of subjects is divided into two parts. In respect of those in Part I the Centre has only powers of legislation while, in regard to the subjects in Part II, the Centre will also have the right to issue directions to a province, if the necessary provision to issue such directions is

incorporated in the Central Act concerned. The more important of the subjects which are related to health are shown below:

PART I

- (1) Marriage and divorce; infants and minors; adoption.
- (2) Legal, medical and other professions.
- (3) Lunacy and mental deficiency, including places for the reception or treatment of lunatics and mental defectives.
- (4) Poisons and dangerous drugs.
- (5) Inquiries and statistics for the purpose of any of the matters in this part of this list.

PART II

- (1) Factories.
- (2) Welfare of labour; conditions of labour; provident funds; employers' liability and workmen's compensation; health insurance, including invalidity pensions; old-age pensions.
- (3) The prevention of the extension from one unit to another of infectious or contagious diseases or pests affecting men, animals or plants.
- (4) Shipping and navigation on inland waterways as regards mechanically propelled vessels, and the rule of the road on such waterways; carriage of passengers and goods on inland waterways.
- (5) Inquiries and statistics for the purpose of any of the matters in this part of this list.

All other subjects are included in the field of provincial health administration. Thus the responsibility for the provision of medical relief and preventive health care for the people, the training of all classes of health personnel and improvement of environmental hygiene, including town and village planning, housing, water supply and sanitation, all fall within the jurisdiction of Provincial Governments.

What has been described above represents the existing functions of the Central and Provincial Governments. Important constitutional changes are now under active consideration, the result of which may well be a further transference of health duties to the Provinces with greater freedom for them to shape their health policy on their own initiative or in collaboration with neighbouring provinces.

In former editions of this work full details of the medical administration of India were given, but matters are—and for some years will be—in such a state of change that it would be a waste of time either to describe obsolete systems or to prophesy what will happen in the future. For a possible forecast, however, the reader is referred to the Bhoze Committee Report, from which some extracts are given below.

The extent of provision that exists in the Provinces for medical relief and preventive health work is indicated by a series of tabular statements which are given as appendices Nos. I, II, III, IV and V. They have been reproduced from Chapter III, Volume 1, of the

Report of the Health Survey and Development Committee (Bhore Committee Report) and they deal with (1) the number of medical institutions, (2) bed strength in the different provinces of British India and in certain other countries, (3) strength of nursing staff employed in medical institutions in rural and urban areas, (4) number of special hospitals and other institutions, and (5) the staff employed for preventive health work in rural and urban areas in the provinces

Co-ordination of Central and Provincial Health Activities and Establishment of the Central Advisory Board of Health

The provinces are autonomous, to a large extent, in all matters regarding internal health policy and administration. This position has existed, broadly speaking, from 1921 when the Government of India Act, 1919, was brought into operation. In the succeeding years the importance of providing machinery for co-ordinating the activities of the Centre and of the Provinces became increasingly evident. In 1937 the Government of India established the Central Advisory Board of Health for this purpose, its chairman being the Member in charge of Health in the Viceroy's Executive Council and its members the Health Ministers of the different provinces and the representatives nominated by a certain number of Indian States. Between 1937 and 1943 the Board held five meetings at intervals of about 18 months. In addition to the discussion of various matters relating to health administration, it made a valuable contribution to the study of health problems in India through the reports of a number of special committees which it appointed to investigate such problems. These reports deal with (1) maternity and child welfare, (2) inoculation against cholera of pilgrims attending fairs and festivals, (3) control of leprosy in India, (4) school health service and (5) food adulteration and its control. Apart from such studies the results achieved have been relatively small, partly owing to the intervention of World War II and partly to the absence of active steps to promote collaboration between the Centre and the Provinces in the carrying out of the recommendations of the Board.

MEDICAL SERVICE FOR WOMEN

The first hospital for women and children was started in 1869, under the auspices of the American Methodist Episcopal Mission, in Bareilly in the United Provinces. Similar efforts followed at Lucknow, Delhi and other places in northern India. In 1883 the Cama Hospital was established in Bombay as the first Government hospital in India for women. In due course similar developments took place in Madras, Guntur, Lahore, Allahabad, Cawnpore and other places. Various Christian Missions have taken a prominent part in developing medical services for women and children in this country.

In 1885 Lady Dufferin founded the "Countess of Dufferin Fund" or the "National Association for supplying female aid to the women

of India" for the purpose of promoting medical education and relief to women and the provision of nurses and midwives. From these beginnings there emerged the Women's Medical Service, which is almost entirely financed by the Government of India. Its officers are in charge of a number of hospitals for women and children in the provinces and the Service also provides professors to the Lady Hardinge Medical College in New Delhi, which is exclusively for the training of women in medicine. The college is affiliated to the Punjab University and trains students for its M.B., B.S. degrees.

THE CO-ORDINATION OF CURATIVE AND PREVENTIVE HEALTH ACTIVITIES

At the Centre the Public Health Commissioner, while dealing directly with the Government of India in matters relating to international health and certain other matters, is also a Staff Officer in Public Health in regard to the administration of the Medical Research Department and some other institutions. The Public Health Commissioner is the Secretary of the Scientific Advisory Board of the Indian Research Fund Association and thus, in the fields of medical research and of general health administration, there is provision at the Centre for the co-ordination of preventive and curative health activities to a considerable extent. In the provinces, on the other hand, the position is that the Medical and Public Health Departments have been functioning, for some time past, largely independently of each other. In the development of health services, in this country, curative medicine received, as in other countries, greater attention for a considerable time and it has only been within the past quarter of a century that skeleton preventive health services have been developed in the provinces. The separation of the two departments has, within this period, helped to focus attention on the need for promoting preventive work and thus the development of the public health department in the provinces has been encouraged to a greater extent than in the previous period, but, in any organized community health service, preventive and curative health activities must dovetail into each other in order to produce maximal benefit to the people, and the need for combining the two departments in one organization as an essential part of the country's health expansion programme has now been generally accepted.

HEALTH LEGISLATION

Both at the Centre and in the Provinces legislation relating to health is scattered over a number of enactments dealing with diverse subjects. For instance, some forty or fifty Central Acts contain provisions relating to health, examples being the Quarantine Act, 1825, the Indian Merchants' Shipping Act, 1859, the Indian Penal Code, 1860, the Vaccination Act, 1880, the Medical Act, 1886, the Indian Railways Act, 1890, the Births, Deaths and Marriages Registration Act, 1896, the Epidemic Diseases Act, 1897, the Code of Criminal Procedure, 1898, the Glanders and Farcy

Act, 1899, the Indian Factories Act, 1911, the Indian Steam Vessels Act, 1917, the Indian Red Cross Act, 1922, the Indian Mines Act, 1923, and the Cantonments Act, 1924. These various Acts were brought into being at different times and the powers they confer are to be exercised by different authorities. Both at the Centre and in the Provinces it is considered that, in order to promote the development of health administration on sound lines, consolidated Public Health Acts should be enacted so as to bring together the various legal provisions relating to health and to entrust all the more important health functions to some central body such as a Ministry of Health instead of making a number of separate authorities responsible for the administration of these laws.

MATERNITY AND CHILD WELFARE

Mothers and children form two vulnerable sections of the community requiring special health protection in every country. In India nearly half the total annual deaths are among children under two years of age, about half of these being in children under the age of one year; the maternal mortality rate is at least six or seven times that of the more progressive countries.

In a previous paragraph it was pointed out that the existing health services for the people were totally inadequate to meet their needs. In the field of maternity and child welfare the position is even worse. To quote from the Report of the Bhole Committee, "the existing number of midwives is probably 5,000 while, for adequate service to the people, 100,000 are considered necessary. The total number of health visitors in the country is about 700 or 750 and for the supervision of the work of 100,000 midwives about 20,000 health visitors will be required. The number of women doctors with special training in maternity and child welfare work is about 70 or 80 and of these, only a dozen are women graduates in medicine with adequate special training in maternity and child welfare work".

The maternity and child welfare movement started in India under the auspices of voluntary agencies and so far much of the work in this field continues to be under the direction of such agencies. Early attempts were directed towards the training of indigenous *dais* (or women who practise midwifery on traditional lines). Miss Hewlett, of the Church of England Zenana Mission, made the first effort in this connexion as early as 1866. In 1918, a school for the training of health visitors was opened in Delhi and in 1919 the Lady Chelmsford All-India League for maternity and child welfare was established. Under the auspices of the Indian Red Cross Society a Maternity and Child Welfare Bureau was created in 1930 with an officer of the Women's Medical Service as its Director in order to promote the development of maternity and child welfare work throughout the country. In 1933 a special course in the subject for qualified women medical graduates was inaugurated at the newly established All-India Institute of Hygiene and Public Health, Calcutta. For a country of India's size and population the efforts

so far made for providing adequate health protection to mothers and children are far too meagre to make any impression on the existing rates of morbidity and mortality among these sections of the population. The first step to be taken for an improvement of the existing state of affairs is for Governments to take the responsibility for the development and maintenance of this service. Even now in some provinces the maternity and child welfare organizations, although supported heavily by grants from the Provincial Governments concerned, are permitted to be run under the control of voluntary agencies. These Governments should take over the organizations and make them integral parts of the provincial health service. Indeed, provision of adequate preventive care and medical aid to mothers and children will be possible only if this branch of health work becomes a part of the general health service for the community.

NOTE BY THE EDITOR

On the other hand, a very simple calculation shows that widespread disaster cannot be far distant if the net population of India continues to increase at its present rate; the land cannot support more than a certain number of people, and even if improved methods of agriculture were acceptable to the rural population the effect would be insufficient and transitory. Fertilizer factories and irrigation schemes may improve matters for the time being, but the ultimate result of these enterprises will only be a further increase in the population, for the simple reason that the present Indian standard of living is low. Even if some genius discovered how to produce a good monsoon every year the result, with education at its present level, would be the same.

Foodstuffs can be imported from abroad, but the rest of the world is hardly likely to starve itself in order to pander to the reproductive prodigality of a single country.

In course of time Nature produces her own remedies, which, unlike those of science, are apt to be both painful and drastic, and one of the chief problems facing India is the curtailment of her surplus population without the assistance of a major holocaust. Even the most bigoted persons can hardly wish for the re-introduction of pestilence, famine and civil war.

The only alternative appears to be widespread education; apart from inducing a wish for a higher standard of living this would have two results; it would increase the cost of bringing up children in what their parents considered a worthy manner, and therefore suggest that fewer children could be brought up better; it would also make people less improvident and even give them some knowledge of physiology, so that they would be both willing and able to practise some form of birth-control.

It must be remembered that instructions to "increase and multiply exceedingly" were given when the death-rate was very much higher than it is today, even in India, and immensely higher than we hope it will be in the India of the future.

It might even be profitable to revive the I.C.S. as the Indian Contraception Service.

HEALTH SERVICES FOR SCHOOL CHILDREN

A satisfactory school health programme should provide for continuous health protection to this section of the community through the development of the necessary remedial and preventive health services and through the provision of supplementary nutrition to those who are in need of it as well as of adequate facilities for physical training and recreational activities for all pupils. In India no such comprehensive scheme covering the whole school-going population in the area concerned has been developed by any health authority.

It was in Baroda City that school medical inspection was first started in 1909 and, while some form of school health service has been developed in the different provinces in the succeeding years, the areas covered by such services, the types of schools served and the extent to which provision is made for the rectification of the defects discovered during medical inspection have differed widely. On the whole the children attending middle and high schools have been catered for to a greater extent than primary school children. In some of the larger towns and cities, e.g., New Delhi and some cities in the United Provinces, whole-time school medical officers are employed and they, in addition to the medical inspection of school children, run clinics at which treatment is given for simple ailments, and carry out health education in the schools. In some places the authorities have also secured the services of specialists on a part-time basis for dental and ophthalmic services. In the majority of the areas where medical inspection of school children is being carried out the pupils are referred for such treatment as may be necessary to the nearest public hospital or dispensary. In view of the high pressure under which these institutions work, the medical relief offered to such pupils is of the most meagre description. A brief reference to existing school health services in a number of provinces will be found on pages 68 and 69 of Volume I of the *Report of the Health Survey and Development Committee*.

SUPERVISION OF FOOD SUPPLY

The enforcement of adequate measures to ensure the purity of the community's food supply is an essential part of health administration. The measures required may broadly be divided into two groups. (1) those which are concerned with the supervision of the production, storage, transport and distribution of articles of food and drink which are intended for consumption by the public and, (2) the steps necessary for preventing the adulteration of food. In regard to the first, bacteriological and chemical examinations of samples are necessary at various stages of production and distribution, particularly in respect of such articles as ice-cream, ice and milk.

In India, local health authorities are responsible for the enforcement of the law relating to the control of food supply, while Provincial Governments possess considerable powers to supervise the

functions of these authorities and to require of them the due performance of their duties. Under the Local Self-government Acts, which have brought them into being, these authorities possess adequate powers to regulate the maintenance of slaughter-houses, markets, sweetmeat shops, hotels, restaurants and other eating establishments as well as to seize and destroy articles of food or drink which are unfit for human consumption. In the absence of a strong public opinion demanding reasonable standards of cleanliness in the production and distribution of food, these health authorities, however, have largely failed to exercise their powers adequately and it seems correct to state that, in the majority of cases, articles of food are being produced and offered for public consumption in such a manner as to constitute a grave danger to the public health.

The position regarding food adulteration is also far from satisfactory. Under the Provincial Food Adulteration Acts local health authorities are responsible for this function also. Each Provincial Government is empowered to apply the Act to the whole area of a province or to particular local areas and to all or particular articles of food. Each Government has also considerable powers of supervision and control over local authorities in respect of the duties to be performed by the latter under the Food Adulteration Acts. The working of these Acts in the provinces was reviewed carefully in 1941 by a special Committee appointed by the Central Advisory Board of Health. The Committee pointed out: (1) that "in certain provinces the operation of the Act has been extended to specific areas, without due consideration being given to the need for ensuring that the local authorities concerned possess adequate funds and personnel to enforce the Act; (2) that many local authorities have failed to avail themselves, to a reasonable extent, of the facilities for getting samples of food examined, which have been provided by the Provincial Governments concerned, and (3) that a varying measure of laxity exists in some of the provinces in the enforcement of the law against offenders under the Act through failure to prosecute them". Inadequacy of the fines imposed by magistrates on persons who are convicted is another cause, the Committee said, for the ineffective functioning of the Act. It has also pointed out that the figures it received from the provinces showed that, in one province, 100% of the samples in respect of milk and milk products were adulterated and that, when samples of all articles of food were considered together, the percentage of adulteration was 84.9. The need for ensuring a definite improvement in the administration of the law against food adulteration is therefore evident.

CONTROL OF DRUGS

Control of the manufacture and sale of drugs in India and of their import from other countries has not yet started on any effective scale but active steps are under consideration and a brief reference to the proposed measures, therefore, may be made. In tracing the history of legislation in respect of drugs reference may be made to

the report of the Drugs Enquiry Committee, 1931, presided over by Colonel Sir Ram Nath Chopra, the leading pharmacologist of India, who has contributed a great deal towards the formulation of sound principles on which to build the drug industry in India. The report of the Chopra Committee was largely responsible for bringing prominently before the Government, the Legislature and the public the need for comprehensive legislation for drug control. With the concurrence of Provincial Legislatures a bill "to regulate the import, manufacture, distribution and sale of drugs" was passed into law by the Central Legislature in 1940. This is known as the Drugs Act. This Act provides for the regulation of the import into and the manufacture, distribution and sale in British India of all drugs, including biological products. Medicines and substances exclusively used or prepared for use in accordance with the Ayurvedic or Unani system of medicine have been exempted from the application of the Act. Under the existing Constitution control of drugs is a function of Provincial Governments within their own territories. The administration of the Act, in so far as it relates to import into British India and the manufacture, distribution and sale of drugs in Centrally Administered Areas, is the responsibility of the Central Government. The Central Government is also responsible for the registration of patent and proprietary medicines.

Provincial Governments will maintain their own drug control organizations consisting of drug control laboratories, licensing authorities, inspectors and other personnel. In addition there will be a Central Drugs Laboratory maintained by the Government of India, to which reference will be made in cases where the opinion given by a Provincial Drugs Laboratory on a sample is contested in a Court of Law. The Chopra Committee recommended the establishment of the Central Drugs Laboratory and, without waiting for legislation, the Government of India established in 1936 a Biochemical Standardization Laboratory. This will now be expanded to form the Central Drugs Laboratory required under the Act. The functions of the Central Drugs Laboratory so far as the testing of biological products (e.g., sera, vaccines, penicillin, etc.) is concerned will be carried out by the Central Research Institute, Kasauli.

Another provision of the Drugs Act is the establishment of a Drugs Advisory Board to advise the Central and Provincial Governments in respect of technical matters and to carry out other functions assigned to it under the Act.

Certain rules framed under the Act were issued by the Central Government in 1945 to regulate the import of drugs into British India, the functions and procedure of the Central Drugs Laboratory and the manufacture, distribution and sale of drugs in Centrally Administered Areas. Rules regulating manufacture, distribution and sale in the provinces were issued by Provincial Governments and, by mutual agreement, the rules made by individual Governments are substantially the same and correspond to those issued by the Central Government with reference to the areas administered by it.

The enforcement of the Drugs Act throughout British India began on the 1st of April, 1947. For the administration of the Act the Central Government appointed a Drugs Controller under the Director General, Indian Medical Service. This officer is the Licensing Authority for the import of drugs and is assisted by Assistant Drugs Control Officers at ports. The Drugs Controller's advice is available to the provinces in all matters relating to the administration of the Drugs Act.

"The standards to be complied with by all classes of drugs whether imported, manufactured or sold are laid down in the Schedule to the Drugs Act, 1940. In addition to the *British Pharmacopoeia* and *British Pharmaceutical Codex*, the Act permits further standards to be prescribed and the *United States Pharmacopoeia* and the *National Formulary* of the United States have been recognized as legal standards in the Rules. If standards for certain drugs are not specified in the latest edition of the *British Pharmacopoeia* but are given in the *British Pharmaceutical Codex*, the latter is to be taken as the legal standard. If standards for certain drugs are not specified in the latest edition of the *British Pharmacopoeia* or the *British Pharmaceutical Codex*, but are specified in earlier editions of the *British Pharmacopoeia*, the standards of these drugs will be those in the latest edition of the *British Pharmacopoeia* in which they are given." Additional standards for the strength, quality and purity of biological and other special products are specified in the Drugs Rules.

VOLUNTARY ORGANIZATIONS ENGAGED IN HEALTH ACTIVITIES

Reference is made here to the Indian Red Cross Society, the Indian Council of the British Empire Leprosy Relief Association (B.E.L.R.A.), and the Tuberculosis Association of India, all of which have their headquarters at New Delhi with branches in the Provinces and in Indian States, as well as to the Ramakrishna Mission. The last is a religious body named after a great Indian saint of the last century, Sri Ramakrishna Paramahansa. His most-outstanding disciple was Swami Vivekananda, a man who combined in himself a profound knowledge of Hindu philosophy, which he derived from his Master, and that love of humanity which impelled him to animate the religious order he founded with a spirit of service, which has continued to manifest itself in the varied social activities of this organization. It maintains a number of medical institutions for general medical relief and for tuberculosis work and has interested itself in various forms of social service such as are needed during floods, earthquake disasters and famines, in order to alleviate human suffering and promote the well-being of the affected communities and thus help to advance the cause of the public health.

The Red Cross Society in India has made special contribution, besides its usual activities, in two directions in the field of health, namely, (1) the promotion of the health and welfare of mothers and children, and (2) health education. As regards the first, reference

has already been made to the Maternity and Child Welfare Bureau maintained by the Society. In the absence of an expert adviser under the Central Health Department to assist the provinces in the organization of health services for mothers and children, the Director of the Bureau has carried out, during recent years, this important function. She has also been responsible, as the Secretary of the Lady Reading Health School, for the administrative control of the best health school in the country. The Society has organized and maintained a number of maternity and child welfare centres in the Provinces with financial support from their Governments. Indeed, in certain provinces, the whole organization working in this field of health administration has been under the Red Cross Society. Its contribution to health education has been mainly through the preparation of propaganda material for use by health authorities throughout the country.

The Indian Council of the British Empire Leprosy Relief Association was established in 1925, the necessary funds having been raised by a public appeal issued by the Viceroy of India, Lord Reading. A sum of Rs. 20 lakhs was collected and the interest derived from this amount is divided approximately equally between the central organization and the provincial branches. The latter have mainly concerned themselves with the establishment of clinics for the treatment of patients with leprosy and with the carrying out of surveys for mapping out the incidence of the disease in local areas. The heads of the provincial Medical and Public Health Departments are generally members of the Executive Committees of the provincial branches of the B.E.L.R.A. and thus a large measure of co-ordination of anti-leprosy work carried out by the Association and by Provincial Governments is secured. The central organization has actively pursued the promotion of leprosy research, the provision of facilities for special training in leprosy for doctors, propaganda and co-ordination of anti-leprosy work undertaken by provincial branches.

The Tuberculosis Association of India fulfils, in the field of tuberculosis, more or less the same functions which the Indian Council of B.E.L.R.A. performs in respect of leprosy. The first central organization which was formed to promote anti-tuberculosis work all over India was the King George V Thanksgiving Anti-tuberculosis Committee, with funds raised by public subscription to commemorate his recovery from illness during the winter of 1928-29. This Committee, which had an income of about Rs. 53,000 per year, had a central organization at New Delhi and branches in the Provinces and States. Later, in December, 1937, Her Excellency the Marchioness of Linlithgow issued an appeal on behalf of the King Emperor and, with the generous response from the people which followed, the Tuberculosis Association of India was formed in 1939. At that time the funds of the King George V Thanksgiving Anti-tuberculosis Committee were incorporated with those of the new organization. The outbreak of the war, which followed shortly after, greatly curtailed its activities, but three major measures may be mentioned. These are:

- (a) The establishment of the tuberculosis clinic in New Delhi;
- (b) The creation of the Lady Linlithgow Sanatorium at Kasauli, and
- (c) The inauguration of a scheme of organized home treatment in certain parts of Delhi urban area.

Other activities of the Association included the holding of four conferences of tuberculosis workers at New Delhi and the organization of training courses in tuberculosis for doctors and health visitors.

Of the money collected by the appeal in 1937 in individual Provinces and States, 95% was handed over to the Provincial or State branch of the Association in order to enable the latter to develop treatment facilities through the establishment of hospitals and clinics. The central organization concerns itself with offering expert advice and co-ordinating the activities of the branches, the training of tuberculosis workers, propaganda and the promotion of consultation by conferences.

THE PROPOSALS OF THE BHORE COMMITTEE

In October, 1943, the Government of India appointed a Health Survey and Development Committee under the Chairmanship of Sir Joseph Bhore. This Committee made a survey of existing health conditions and suggested a comprehensive plan of development which, if implemented, will give the country a modern health organization providing reasonable standards of preventive care and medical relief to the people in urban and rural areas. In giving only in brief outline the main features of the scheme when it is completed in a period of thirty to forty years, the Committee has described in some detail the proposals it recommends for the first two five-year periods of the execution of its plan. During the first ten years the average annual *per capita* cost of the scheme will be under Rs. 2 and, by the end of that period, the proposed health organization will have covered about half the population of British India. In terms of the country's population the expenditure involved will be considerable (about Rs. 1,000 crores within the ten-year period), but health administration has in the past received so little attention from Governments in the country and the expenditure on health has been so low as to necessitate what may appear to be an abnormally large outlay of public funds if a noticeable improvement in the health of the community is to be achieved. The Bhore Committee pointed out that, in 1944-45, the combined expenditure in the provinces on the medical and public health departments varied from 2·8 annas to 10·9 annas, while of the total expenditure on all branches of administration the money spent on health varied from 2·5% to 7·3%. Even after making allowance for India's much lower national income, the Committee said that it should spend about Rs. 3. 3. 0. per head of the population on health in order to reach the level of expenditure incurred in Great Britain in 1934-35.

APPENDIX I

NUMBER OF MEDICAL INSTITUTIONS

Provinces	Hospitals and Dispensaries			Average urban population served by one medical institution	Average rural population served by one medical institution
	Urban	Rural	Total		
(1)	(2)	(3)	(4)	(5)	(6)
Assam	59	229	288	4,756	43,337
Bengal	304	1,511	1,815	19,730	37,996
Bihar	125	528	653	18,630	62,744
Bombay	316	442	758	17,127	34,927
Central Provinces and Berar	184	223	407	11,379	66,008
Delhi	21	13	34	33,128	17,096
Madras	276	972	1,248	28,496	42,672
North-West Frontier Province	59	123	182	9,359	34,053
Orissa	21	160	181	15,276	52,548
Punjab	287	778	1,065	15,188	30,925
Sind	73	154	227	12,215	23,658
United Provinces	388	456	844	17,668	105,626

APPENDIX II

BED STRENGTH IN THE DIFFERENT PROVINCES OF BRITISH INDIA AND IN CERTAIN OTHER COUNTRIES

(A) BRITISH INDIA

Provinces	Total number of beds	Ratio of bed to population	No. of beds to 1,000 of the population
Assam	1,469	1 to 8,729	0.115
Bengal	10,905	1 to 5,530	0.181
Bihar	6,025	1 to 6,031	0.166
Bombay	7,979	1 to 2,613	0.383
Central Provinces and Berar	2,738	1 to 6,140	0.163
Delhi	1,382	1 to 664	1.506
Madras	14,776	1 to 3,339	0.299
North-West Frontier Province	1,868	1 to 1,626	0.615
Orissa	1,386	1 to 6,298	0.159
Punjab	12,307	1 to 2,309	0.433
Sind	2,037	1 to 2,205	0.454
United Provinces	11,219	1 to 4,500	0.222

(B) OTHER COUNTRIES

	Ratio of beds per 1,000 of population	Remarks (year)
United States	10.48	(1942)
United Kingdom	7.14	(1933)
France	3.72	(1929)
Germany	8.32	(1927)
U.S.S.R.	4.66	(1940)
British India	0.24	—

APPENDIX III

STRENGTH OF NURSING STAFF EMPLOYED IN MEDICAL INSTITUTIONS IN
RURAL AND URBAN AREAS

Province	Nurses employed in medical institutions					
	Rural			Urban		
	European and Anglo- Indian	Indian	Total	European and Anglo- Indian	Indian	Total
Bengal	13	29	42	392	536	928
Bihar	17	26	43	97	196	293
Bombay	2	42	44	211	957	1,168
Central Provinces and Berar	4	25	29	31	177	208
Madras	655					
North-West Frontier Province	1	12	13	5	94	99
Orissa	3	4	7	11	27	38
Sind	103					
United Provinces	257					
Assam	—	48	48	14	—	14
Delhi	—	—	—	104	200	304

APPENDIX IV NUMBER OF SPECIAL HOSPITALS AND OTHER INSTITUTIONS

Serial No	Province	Tuberculosis										Venereal Diseases Hospitals							
		Maternity and Child Welfare Centres		Eyes Hospitals		Mental Institutions		Sanatoria		Tuberculosis Hospitals		Other Institutions, namely with Tuberculosis beds		Leprosy Institutions		Infectious Diseases Hospitals		Total beds	
		No.	Total Mater. and Child beds	No.	Total beds	No.	Total beds	No.	Total beds	No.	Total beds	No.	Total beds	No.	Total beds	No.	Total beds	No.	Total beds
1	Assam	..	..	..	716	1	28	..	..	10	98	3	..	..	..	..	..	..	..
2	Bengal	37	821	1	139	2*	115	2	318	27	247	6	585	1	18	1	82	..	..
3	Bihar	21	352	..	..	2	1,631	1	130	..	97	8	2,178	1	16	..	..	..	..
4	Bombay	118	..	3	118	4	2,259	8	593	3	237	15	1,625	3	424 (for 2)	..	..	..	..
5	Central Provinces and Berar	83	323	..	..	1	600	1	151	..	..	7	91	9	2,202	2	28	..	..
6	Delhi	..	..	1	74	..	..	..	..	1	96 (C.R. nic.)	8	..	1	45	1 (Ch. nic.)	..	..	..
7	Madras	..	..	1	170	3	3,416	5	513	1	62	17	400	12	2,902	3	210	..	..
8	North-West Frontier Province	..	..	..	..	1†	140	1	144	..	..	6	152	..	..	..	..	..	..
9	Orissa	39	97	..	..	..	..	..	..	..	..	3	13	2	483	..	..	..	..
10	Punjab	106	343	..	..	1	3,408	9	654	3	163	14	348	6	871	..	..	..	..
11	Sind	5	..	2 hospitals and 2 mobile institutions	..	1	348	2	123	..	..	..	..	1	175	1	50	..	..
12	United Provinces	..	..	6	426	5	1,356	5	295	..	..	8	184	16	1,223	16	282	..	..

* In Bengal, one is an institution to which mental cases are removed for observation and the other a private hospital with very limited accommodation.

† In North-West Frontier Province (Peshawar), in addition there are two mental barracks in the Central Jail.

‡ Of these four are women's hospitals with a total bed strength of 697, of which 265 beds are for maternity and gynaecological cases.

(B) OTHER STAFF EMPLOYED FOR PREVENTIVE HEALTH WORK IN RURAL AND URBAN AREAS FOR THE DIFFERENT PROVINCES

(B) OTHER STAFF EMPLOYED FOR PREVENTIVE HEALTH WORK IN RURAL AND URBAN AREAS										
Provinces	Sanitary and Health Inspectors		Vaccinators				Midwives		Trained staff	
			Males		Females					
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
North-West Frontier Province	..	21	26	18	..	1	..	2	53	10
Punjab ..	67	185	370	160	..	5	2	2	2	2
United Provinces ..	223	209	762	195	..	..	160	199	54	80
Bihar ..	..	186	1,422	..	..	..	..	1	1	..
Orissa ..	56	15	303	10	5	2	2	4	10	16
Bengal ..	691	112	2,176	145	53	30	55	88	3,317	728
Central Provinces and Berar ..	..	63	286	94	..	..	..	104	76	608
Bombay ..	12	132	241	53	..	..	2	2	2	2
Sind ..	11	45	88	27	..	6	7	12	33	18
Madras ..	514	300	..	229*	679†	..	176	285	4	..
Assam ..	..	95	45	..	..	..	..	..	..	..
Delhi ..	8	29	22	18	17	..	8	1	17	39
Coorg ..	2	2	..	..	..	..	4	2	..	..
Bahuchistan ..	4	5	7	1	..	..	..	2	..	6

*Includes males and females.

†Includes males and females.

‡No figures available.

THE SIMEONS PLAN

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AN EXPERIMENT IN RURAL MEDICAL RELIEF

By A. T. W. SIMEONS, M.D.

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The question of providing rural medical relief is receiving great attention throughout the country. Although a number of different schemes have been tried, none have, to my knowledge, proved very satisfactory. It was, therefore, decided to make an experiment with what we call "rural sub-dispensaries" run by laymen who have received a short course of training. It was also decided to make a small charge for the medicines, but no fees were to be charged.

The system works as follows:

(1) Villages with a population of over 1,000 inhabitants, or groups of smaller villages, are visited and encouraged to apply on a prescribed form for the opening of a rural sub-dispensary. In the application they agree to provide a clean, well-lit, well-ventilated and centrally situated room, with furniture. They agree to choose from among themselves candidates for training from whom the D.P.H. selects the most suitable one. The qualifications entitling a person to the candidature are that he must be a respectable permanent resident of the village with an assured income and an education not less than Vernacular Final. The choice must be approved by the patel, the president and the members of the *gram panchayat*, and other prominent villagers.

(2) When a candidate is approved, he must at his own expense (or at the expense of the village) spend 14 days in Kolhapur City for training. He is given a vernacular text-book specially written for this purpose.* During their training, much time is devoted to teaching them to recognize diseases which they are not allowed to treat and which they must immediately refer to a qualified doctor. It is made very clear to all sub-dispensers that they can in no way consider themselves entitled to "practise medicine." They are taught to regard themselves as agents for the supply of Government remedies. Great stress is laid on this point, to counteract one criticism the scheme has evoked, namely, that it encourages quackery.

(3) At the end of the training, the candidate appears for a short *viva voce* examination in which he is only required to show that he has fully mastered the contents of his text-book and has acquired the necessary proficiency in dressing wounds, taking temperatures, keeping tidy records, etc. If he passes, he is given a certificate entitling him to work in Kolhapur State as a rural sub-dispenser.

(4) Rural sub-dispensers are paid an honorarium of Rs. 5 per

*This textbook has been published in Marathi. It contains chapters on "Rules and regulations" governing sub-dispensaries; instructions on record, book and stock keeping; a detailed description of each medicine supplied, giving its use, dosage, indications, etc.; an index of the commonest illnesses, with instructions how to recognize and treat them. It is written in the plainest possible style.

month. They are bound to keep the dispensary open for at least half an hour every day. No dispensary may remain closed longer than 48 hours, including holidays, without a written application for leave having been sanctioned.

(5) Rural sub-dispensers are strictly forbidden the use of any kind of drug, medicine or medical appliance other than those supplied to them by Government. They are not allowed to treat cases in any way other than described in their text-book. Diseases which are not covered by this text-book may not be treated by them. They are not allowed to take any form of fee. They are not obliged to attend patients outside dispensary hours nor to visit the sick in their homes. They are, of course, free to do this if they wish, but they cannot charge any fee for such services.

(6) The prices of medicines have been fixed in such a way that on an average 1 to 3 days' treatment costs one anna. This money is collected from the patients. In some cases this price exceeds the actual cost of the medicine; in others it is less. The set of medicines supplied and the instructions given with them have been arranged in such a way that as a rule the income from the sale of drugs balances the expenditure. In fact, in most dispensaries, there is a slight surplus. As far as possible, medicines are supplied in tablet form or in ready-packed powders, but in any case the sub-dispensers do not do any compounding. All drugs have been given colloquial names and the sub-dispensers are not taught their composition.

(7) Sub-dispensers have to maintain a careful register in which they enter the symptoms—not the diagnosis—of every case, and all other particulars regarding treatment, payment, etc. They also have to maintain a stock book. They are given printed indent forms, which they send in duplicate to the Public Health Department for fresh supplies with the equivalent in cash.

(8) Each group of 25 sub-dispensaries is visited, controlled and supervised by a full-time inspector of sub-dispensaries who is a registered medical practitioner. His pay is Rs. 60 p.m. plus Rs. 45 A.T.A. His duty is to give advice in difficult cases, to check cash, registers and stocks and to see that the regulations regarding treatment outlined in the text-book are rigorously adhered to.

The cost of running such rural sub-dispensaries is as follows:

(1) Initial cost of installing, equipping, training, etc., approximately Rs. 100 per dispensary.

(2) Maintenance cost including pay of inspectors, and the office staff at headquarters, is roughly Rs. 100 per dispensary, annually. The cost of subsequent indents for medicines is fully covered by the income from the dispensary.

As an experiment, 10 such sub-dispensaries were opened in Kolhapur. Of these, two had to be closed down, the one, because the sub-dispenser left the village and the other, because, on the first inspection, serious financial irregularities were discovered. The remaining 8 sub-dispensaries worked so satisfactorily that a further 22 were opened 4 months later. In all, 60 sub-dispensaries are now operating. The average monthly attendance is 150 per dispensary. Some enthusiastic sub-dispensers have 400 to 500. The success of

these rural sub-dispensaries is further demonstrated by the large number of applications coming in from villages all over the State, asking for the opening of a sub-dispensary.

The Kolhapur Government has now decided to sanction this plan as a permanent institution of the State. The Public Health Department is extending the scheme as rapidly as possible. By the end of 1945, about 150 sub-dispensaries will be established. It is planned to provide every village in the State having more than 1,000 inhabitants, with a rural sub-dispensary. This will mean that 300 such sub-dispensaries will be established, which will require 2 years, and that each will serve an average of about 3,500 inhabitants, involving an annually recurring expenditure of less than Rs. 30,000.

Rural sub-dispensaries are preparing the ground upon which a qualified medical practitioner will later be able to thrive in rural areas.

In a few of the villages where rural sub-dispensaries have been established, there are already qualified doctors in practice, and it was at first feared that their practice might suffer through the opening of a sub-dispensary. Experience has, however, shown that this is not the case. On the contrary, established practitioners are getting more patients, because sub-dispensers have strict instructions to refer all serious cases to qualified men. In almost every case the resident practitioners have, after initial scepticism, found that the establishment of a sub-dispensary has improved their practice and their standing.

The scheme is still very young, and much further experience will have to be gained, but it was thought that any concrete suggestion which experience has shown to be workable should be made known now.

PUERPERAL SEPSIS—See *Obstetrics*.

PULMONARY TUBERCULOSIS

Because of the shortage of sanatorium accommodation and the unwillingness of many patients to undergo sanatorium treatment, much anti-tuberculosis work has to be done in general hospitals and dispensaries or by private practitioners, so the following article is rather more detailed than otherwise would be the case.

It cannot be urged too strongly that every tuberculous patient who can go to a sanatorium or special hospital should do so, but the waiting lists are sometimes very long, and in the writer's opinion it is better to begin treatment early in a village dispensary than to wait until the patient is incurable, untraceable or dead. A list of sanatoria is given at the end of this article.

Much illness and many lives could be saved by a timely examination of sputum; it is so easy to do, and so often left undone.

When any patient has persistent cough, fever, bronchitis, loss of energy or repeated attacks of "influenza," when there is loss of weight or unexplained anaemia or when physical signs are present on one side only, a sputum examination should always be done,

unless, of course, it is a frank case of lobar pneumonia (even then it does no harm and there are occasional surprises). Thanks to more efficient anti-malarial treatment the cases of tubercle diagnosed as "chronic malaria" are getting fewer, but are still far too common.

X-ray pictures are as necessary for the intelligent treatment of tubercle as they are for the treatment of fractures.

PREVENTION.—As tuberculosis is spread by contact, the basic way to prevent infection is to discover and isolate patients suffering from the disease, one of the commonest means of spread being from mother to child.

It is most important to prevent the patient from coughing in the presence of others or without covering the mouth, and from spitting without destroying the sputum.

By means of lectures and lurid diagrams much is being done to prevent the spread of the disease. Literature and wall diagrams can be obtained from the Tuberculosis Association of India.

Milk is a common means of spreading bovine bacilli, which cause much surgical tuberculosis; milk should, therefore, be pasteurized or boiled before being drunk, and herds of cows should be tuberculin tested.

Preventive inoculation by means of Calmette's B.C.G. vaccine has given encouraging results in France and other countries but, although there have been one or two tragedies and its effectiveness is not universally accepted, it seems likely that more research may produce a really valuable and harmless immunizing vaccine.

With normally healthy people, resistance in adult life is acquired from repeated sub-infections in childhood. It seems likely that an actual attack beginning in adult life arises in one of five ways: (1) from exposure to an intolerably heavy infection, (2) from the rupture of a previously enclosed focus, (3) from the bad effect of an attack of influenza, pneumonia or some other disease on a hitherto suppressed focus, (4) from the development of allergy to the disease, or (5) from the exposure of a non-immune person to infection.

The Mantoux Skin Test shows that a person either has been or is infected but does not distinguish between the two. As Burrell remarks, one great value of the test is that a positive result in young children suggests the presence of a carrier in the house. Another is that a negative result in an adult suggests that he has little or no acquired immunity, so that he is more liable than others to pick up tuberculosis; it is obvious that such a person should neither nurse nor treat cases of "open" tuberculosis. The Mantoux Test is carried out as follows:

Into a cleansed area of skin on the front of the forearm make an intra-cutaneous injection of 0.2 c.c. of a 1:10,000 dilution of Koch's Old Tuberculin; if nothing happens within three days, repeat the injection with a 1:1,000 dilution, and if necessary, three days later with a 1:100 dilution. A positive result consists of a raised red area at the site of injection after 24-72 hours.

Miniature Mass Radiography.—A Mobile Photo-Fluorographic Unit costs about a lakh of rupees, but provided that the roads are

good it can cover a very large area and soon pays for itself by preventing sanatorium expenses and loss of working hours.

It detects cases long before clinical signs and symptoms appear, when they are in the stage at which they can be cured by home treatment; of this, by far the most important part is the intelligent co-operation of the patient and his relatives; after two or three months' rest at home many of these patients can be considered cured. It is estimated that about fifty patients can be treated in this manner for the cost of one patient in a sanatorium. We may therefore hope that the method will become widespread and popular, because it is a first-class investment from both the humanitarian and the industrial point of view.

TREATMENT.—

EARLY CASES.—As this is the most curable stage every effort must be made to get the patient into a sanatorium. Failing this, the principles of treatment are. (1) fresh air, (2) good food, (3) regular rest, all of which are possible for the well-to-do, but not for the poor man or woman living in the plains and with a family to maintain. The only answer is to let the family maintain the patient until he or she is fit to resume a normal life.

Fresh air and good food do not cure tuberculosis, but they increase the patient's resistance to the disease, just as they improve the health of anyone else. Again, while debilitating diseases like malaria, typhoid, dysentery or hookworm may be serious for a normal person, they are disastrous for a tuberculous one, so must be carefully guarded against.

Fresh air, in the plains of India, when the day temperature is about 110° and the night air laden with mosquitoes, is not the beneficial thing we seem to assume when, as above, we advise it, but the tonic property of cool, clean air makes it more than ever necessary to send tuberculous patients to the hills in summer. If, as is often the case, this is impossible, the coolest room in the house should be allotted to the patient, and he should live in it alone, others coming in for social or domestic visits, but nobody else should sleep in the room and children should be kept out. A sputum pot containing phenyle should be provided and the patient made to use it; furniture should be sparse, simple and comfortable, and a latrine should be within reasonable distance. When the patient or the family can afford it, the windows should be mosquito-proofed; this keeps out mosquitoes by night and flies by day; a fan is a great advantage, because it keeps the air fresh and the patient cool. The windows should be open as long as possible, but in the hot weather not during the day. Air conditioners are good, but those who can afford them can afford to go to the hills.

In the case of women all this is more difficult in India than in the case of men, because of the purdah conditions under which they live, but the above principles apply; the burka has—in the writer's opinion—been unjustly blamed, for the simple reason that although the patient wears it when she goes to see the doctor he is not justified in assuming that she always wears it, because she does not. A far

more dangerous practice is that of sleeping with one's head under the bed-clothes.

Diet.—On the whole, Indian diet contains more carbohydrates and vegetable fats, and less protein and animal fats than does European diet. From our present point of view this is a pity, because animal fats, particularly fresh oils, and beef and mutton fat, have a definitely beneficial effect on tuberculosis. Milk, which is permitted by all religions, but cannot be afforded by all patients, is excellent provided it is of good quality and fresh, but the thin blue fluid offered for sale by the itinerant dudh wallah benefits nobody except the person who sells it. For the home treatment of tuberculosis, therefore, the patient or his relatives should possess one or two tuberculin-negative cows (most veterinary surgeons will perform the tuberculin test for a small fee). Two or three pints of fresh milk daily will often have a wonderful effect in both nourishing the patient and increasing his store of calcium and vitamins. The addition of eggs, butter, and mutton or beef with its natural fat will greatly help those whose religion permits. Sheep's kidneys, which in India are always cooked with the peri-renal fat, should be eaten with this fat and form an appetizing and strengthening addition to the diet.

Good fresh vegetables should be included because of their nourishment and for the calcium and vitamins they contain.

Ghi is not so rich in vitamins and nourishment as the milk from which it is—or should be—made, but is superior to vanaspati in these respects: some vanaspatis contain added vitamins and are made under hygienic conditions, so we can confidently say that good quality vanaspati is better than poor quality ghi.

Fruit, either cooked or uncooked, is both beneficial and welcome, and should always be included in the dietary.

Fish has a particular value because it is appetizing, digestible and nourishing; it also contains some vitamin D.

The staple diet of rice and atta must, of course, be given too, otherwise the ordinary Indian patient will not have enough to eat.

In Europe, some authorities have experimented with a salt-free diet, the theory being that salt increases fluid retention and that as tuberculosis is an exudative disease salt, therefore, increases exudation. The plan seems faulty to the writer for three reasons: (1) the fluid theory is by no means proved, (2) the absence of salt makes food unappetizing, and (3) in a warm climate salt is a vital necessity.

The patient should take at least three meals a day, with a glass of milk in between them and it is of the greatest importance that the food should be fresh and nourishing; it must also be attractively served, because there is nothing so likely to take away the appetite as a badly cooked, sloppily served dish.

To sum up:—A good diet is one which the patient enjoys and which makes him put on weight, or at any rate prevents him from losing it.

Sunlight.—The general opinion is that sunlight is good for surgical tuberculosis, often good for early or healing pulmonary tuberculosis, and definitely harmful for advanced pyrexial or

cachectic cases. It used to have the reputation of causing haemoptysis, but this is not proved. Part of its value lies in its psychological effect, and it is better in the hills or in the winter than in the plains in summer.

It is essential to begin gradually, one limb being exposed for five minutes on the first day, the opposite limb the second day, both limbs the third day, and so on; when, after about ten days, the whole body is being exposed the time may be gradually lengthened. In the hot weather the early morning and in the cold weather the middle of the day is the best time.

At any sign of reactionary temperature the treatment should be stopped for a few days and begun again with half the previous dose after the temperature has settled down.

Rest and Exercise.—Rest to the affected part is the basis of all methods of treating tuberculosis, whether it is given by bed, plaster of Paris, air in the pleura, evulsion of the phrenic nerve, bone-grafting, thoracoplasty or merely a quiet life.

In early acute cases the patient should rest in bed for three or four months before being allowed to get up, and exercise should be controlled by the condition of the patient, especially by the temperature and pulse. If the pulse remains above its previous level for half an hour after exercise or if the temperature goes above 99.5°F , the exercise has been too great. A progressively rising pulse and temperature after exercise is an absolute indication for immediate rest.

"It is a very good rule to allow no other form of exercise but walking for at least two years after the disease has become arrested. Patients should never run and should not walk quicker than three miles an hour. Relapse is more likely to occur from over-exercise, especially out-door games, than from any other cause." (Burrell.)

The old aphorism "Do not try to run before you can walk" sums up the exercise programme after tuberculosis.

ARTIFICIAL PNEUMOTHORAX.—Most cases of pulmonary tuberculosis begin on one side, which is why early diagnosis is so important, because if it is made before the other side is affected, artificial pneumothorax, provided there is not constant re-infection from some other source, will generally produce a cure.

As already remarked, the most trustworthy clinical sign of tubercle, anyhow by the time the case comes to the clinician in India, is the presence of post-tussive crepitations; it is at this stage that artificial pneumothorax is most likely to be successful.

In a bilateral case the question is more difficult, but if one side is much worse than the other, artificial pneumothorax should be induced on the worse side. Sometimes, by reducing the disease in the bad side it gives the patient extra strength to overcome that on the other, but in acute cases in which the patient has high fever and is obviously ill it must never be done, because it will make him worse.

X-ray Control is necessary in all cases for several reasons; the extent of the collapse and the condition of the lung can be observed and fluid detected if it should appear, but, much more important, adhesions can be seen, because experience has now shown that a

partial pneumothorax is often worse than none. If, therefore, bands of adhesions are found, either they must be divided by a specialist or the pneumothorax must be abandoned and other methods tried.

Bilateral Artificial Pneumothorax should be carried out only by an expert in a hospital or sanatorium.

The apparatus (see Fig. 33) is now obtainable at most surgical instrument dealers in the large towns and is simple to use. There are various models, but the original Lillingston-Pearson, although cumbersome, is as good as any. Some years ago the writer had one made in the Quetta bazaar for five rupees, and, until it was destroyed by the earthquake, it gave excellent service in the first anti-tuberculosis clinic to be established in Baluchistan.

The principle is that air in a graduated bottle is displaced by fluid from another bottle, and passing through a suitable needle slowly inflates the pleural space, a water manometer incorporated in the circuit showing the intrapleural pressure.

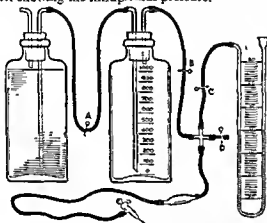


Fig. 33.—Artificial pneumothorax apparatus.

The initial introduction of air is the most difficult and whenever possible should be done in a hospital or sanatorium, in which the patient remains as an in-patient until lung collapse is complete, that is to say after three or four weeks.

Before treatment is begun the physician should explain that to do any permanent good it must be continued for three years, and get the patient's undertaking that he will submit to it. Unfortunately, many patients cease to attend after a few weeks or months and among the uneducated classes it is the greatest rarity for one to "stay the course." However, we can but try.

Artificial pneumothorax is contra-indicated in progressive or severe bilateral disease, in cases that are obviously improving without it, in the presence of marked pleuritic adhesions (often discoverable only after pneumothorax has been attempted) and finally, in a neurotic patient, who will not only make a fuss at each sitting, but will certainly cease to attend after a short while.

For induction a Riviere's needle is the best; it is a trocar and

cannula with centimetres marked on the latter; it is not an advantage, but a drawback, to have a fine needle. For refills any needle may be used, Saugmann's being as good as any.

Induction is carried out as follows:

- (a) After studying the X-ray picture and clinical signs decide which area is least likely to have adhesions.
- (b) The patient lies on the opposite side, with the arm of the affected side above his head, and keeps as still as possible throughout the procedure, breathing gently.
- (c) In the appropriate intercostal space, usually the 5th, 6th or 7th in the mid-axillary line, sterilize a small area of skin and inject some local anaesthetic intracutaneously so as to make a small weal, and then push the needle in vertically, injecting the local anaesthetic down to the pleura.
- (d) Wait three minutes; check up that the apparatus is working properly and that there are no leaks; close all taps except that between the needle and the manometer (C in the diagram).
- (e) Push the pneumothorax needle along the track of the hypodermic needle until it is estimated that the point is in the pleural cavity, withdraw the trocar, close the tap on the needle and watch the manometer. As soon as the pleural cavity is entered, the manometer jumps to a negative pressure of about 10-15 cm., and even with quiet respiration fluctuates freely through a distance of about 5-10 cm. If this does not happen, the cannula is not in the pleural cavity. It is therefore pushed in and out until the welcome jump and fluctuation of the fluid are seen.
- (f) Keep the needle perfectly still and inject about 50 c.c. of air, close cock B and watch the result on the manometer, which should continue to fluctuate as before; if all is well, inject another 250 cc. of air, note the final pressure and withdraw the cannula.

An alternative method, when it is thought that the cannula is in the pleural cavity, is to open cock D and allow the atmosphere to enter as the patient breathes; one cannot measure the amount of air admitted, although of course the manometer, when the cock is closed again, shows the pressure.

Difficulties.—The chief difficulty is that the cannula will not enter the pleural cavity; occasionally, the writer has had success by pushing the cannula in until he thinks it is in the pleural space, then withdrawing the trocar and closing the tap in the needle as before, and allowing a slow stream of air to enter while he moves the cannula forwards and backwards. As the tip of the cannula passes the pleural space the air opens it up; not more than 50 c.c. of air should be used in the attempt, or there will be uncomfortable surgical emphysema, but inability to enter the pleural space usually means adhesions. If the first attempt fails, try in the space above and the space below or near the apex. If four, or at most five, attempts are unsuccessful it means that there are adhesions and the method is both impossible and unsuitable.

A rise and fall of 2-3 cm. on either side of the zero point means that the cannula is in the lung or has not penetrated the parietal pleura.

If there is no alteration in the pressure after injection of a considerable quantity of air, the needle is in the lung. If the pressure rises as soon as the air is turned on, the needle is outside the parietal pleura. If the pressure first falls and then rises quickly there are adhesions. If the pressure is positive and rises quickly, there is fluid.

Refills.—The usual custom is to give the first refill on the day after induction, the next one two days later, the next four, and so on, until a refill is being given once every two or three weeks, the amount of air being increased so that collapse is complete after the fourth or fifth refill. Thereafter the pressure should be atmospheric after the refill; a positive pressure is of no advantage and the extra air is quickly absorbed.

A record somewhat on the following lines should be kept, X-ray notes being added:

<i>Date</i>	<i>Initial Pressure</i>	<i>Volume of air</i>	<i>Final Pressure</i>
1 1 48	-15- -10	250 c.c.	-12- -8
2 1 48	-15- -10	500 c.c.	-10- -5
4 1 48	-12- -7	500 c.c.	-7- -2
8 1 48	-10- -5	750 c.c.	-5- 0
16 1 48	-7- -2	750 c.c.	-5- +5
30 1 48	-10- -5	1,000 c.c.	-5- +5
etc.			

Patients vary considerably in the amount of air required to produce collapse of the lung, also some do better with a complete, others with a partial collapse. Any complaint of tightness in the chest is a signal for stopping the injection, as also is distress of any sort.

It is important not to have too long an interval between refills, as the lung may expand and the pleura adhere; the old interval of a month is now generally shortened to three or even two weeks and the amount of air injected is less than before.

The usual time for the treatment is about three years, at the end of which the lung is allowed to expand slowly, by injecting less air each time.

PHRENIC EVULSION OR CRUSHING—The usual indications are failure of artificial pneumothorax, basal tuberculosis, presence of adhesions which cannot be divided but are dragging on a partially collapsed lung, unilateral fibrosis of a lung, and as a preliminary to thoracoplasty. A successful evulsion or crushing is said to be equivalent to an artificial pneumothorax of 400-600 c.c. It should, therefore, always be considered if the patient is unwilling or unlikely to attend for a full course of artificial pneumothorax treatment, a very frequent occurrence.

The modern tendency is rather away from evulsion and in favour of crushing; this paralyses the diaphragm for about six months, which many workers consider long enough; if not, the operation can be repeated, or evulsion performed at the second sitting.

The writer's view is that crushing is good enough for early basal phthisis or for closing a cavity; it is also useful when apical adhesions

cause dragging on an apical lesion, but if the lung is definitely fibrotic it will probably remain so, hence evulsion is preferable.

The operation is done under a local anaesthetic as follows:

- (a) Make a horizontal incision $1\frac{1}{2}$ inches long one inch above the clavicle, the inner end just overlapping the outer edge of the clavicular head of the sternomastoid.
- (b) Divide the platysma and underlying areolar tissue and retract the edges of the wound. If the external jugular vein is in the way it is retracted or divided.
- (c) Careful blunt dissection is now carried out among the fatty areolar and lymphatic tissue until the omohyoid and the outer border of the sternomastoid are identified.
- (d) Draw the sternomastoid inwards and the omohyoid downwards (if it is drawn upwards one is apt to get too close to the subclavian vein) and by blunt dissection behind and above it clean the surface of the scalenus anticus muscle, which can be felt with the finger.
- (e) When this is done the phrenic nerve is found, lying on the muscle. The nerve is about as thick as a piece of No. 2 catgut and runs in a downward and inward direction (the vagus runs vertically, behind the carotid artery and internal jugular vein, but has been mistaken for the phrenic, with unhappy results).
- (f) Inject a few drops of local anaesthetic into the proximal part of the nerve, wait a minute and then, holding it tightly in a pair of artery forceps draw it upward for an inch or two, divide any subsidiary branches joining the main trunk and open the forceps, thereby releasing the crushed nerve. Alternatively the nerve is divided above the forceps and gently dragged up out of the chest, the writer's method being to draw the nerve up during inspiration and to hold it still during expiration, a small advance being thus made with each breath until finally the whole nerve becomes loose and is drawn out. Sometimes, however, it breaks, but this does not matter if several inches have been removed.
- (g) Attend to haemostasis and sew up, using clips or a sub-cuticular stitch for the skin.

Pneumoperitoneum is a simple way of raising the diaphragm after the phrenic nerve operation or after pregnancy; it is performed in a manner similar to artificial pneumothorax, but the final pressure is higher, about + 20. The needle is inserted in the middle line of the epigastrium and inflation continued until the abdomen is tympanitic; refills are given every two or three weeks. Sometimes the operation is done instead of phrenic nerve interruption.

Thoracoplasty is indicated in apical or upper lobe tuberculosis when artificial pneumothorax has failed. Nowadays, it is generally done in stages and only on the upper ribs. It is becoming increasingly popular, but is an operation for the specialist in a special hospital.

DRUGS.—

Gold.—Myocrisin (oily) or Solganal B Oleosum intramuscularly, Sanocrysin or Crisalbine intravenously are undoubtedly useful in the exudative stage and when there are large numbers of tubercle bacilli in the sputum. The usual dosage is 0.01 gramme to begin with, increased slowly in weekly doses until 0.2–0.5 gramme is given, when the course is stopped. The leucocyte count must be watched, and it is an advantage to give mixed vitamins at the same time.

Calcium.—For some reason this is extremely popular in India, particularly when given by injection. The theory is that it helps resistance to and encapsulation of the tubercle bacilli, and many patients say they feel better for it. It is certainly useful in hæmoptysis and in tuberculous diarrhoea and in other cases it is organically harmless and psychologically helpful.

Vitamins.—Of all the preparations of vitamin D, natural cod-liver oil is perhaps the best, but if even the emulsion causes nausea or indigestion one of the concentrated varieties may be given. (See also Lupus.)

Treatment of Cough.—This is best treated by closing any cavity that may be present, but when drugs are required to relieve a purposeless, rest-disturbing cough, there is nothing to equal heroin; codeine phosphate and opium are also good, but are constipating.

R Heroin Hydrochlor.	..	..	..	gr. $\frac{1}{2}$
Sodu Bromid.	..	..	..	gr. 10
Tinct. Belladonnae	..	..	..	℥ 5
Tinct. Camph. Co	..	..	..	℥ 30
Glycerini	..	..	..	℥ 30
Aq. ad	..	..	..	℥ 3ij
Ft. Linctus; a dessertspoonful to be swallowed slowly, not more than twice in the night.				

It is often a good thing to change the medicine, e.g.,

R Codein. Phos	..	..	..	gr. $\frac{1}{2}$
Phenobarbiton.	..	..	..	gr. $\frac{1}{4}$
Spirit. Vini Rect.	..	..	..	℥ 30
Glycerin.	..	..	..	℥ 30
Aq. ad	..	..	..	℥ 3ij

The British Ministry of Health's Syrup. Cocillanac Co. is also good, as is Parke Davis's Cosylan.

The Brompton Hospital Cough Lozenge has the following composition:

R Extract. Glycyrrhizae	..	..	..	gr. 3
Ol Anisi	..	..	..	℥ 1

Another Brompton Hospital favourite for "loosening the phlegm in the morning" is:

R Sod. Bicarb	..	..	..	gr. 15
Sod. Chlorid	..	..	..	gr. 5
Spirit Chlorof.	..	..	..	℥ 10
Aq Anisi ad	..	..	..	℥ 3ss

to be taken with an equal amount of hot water.

A popular though nasty-tasting expectorant is ammonium chloride, made up somewhat as follows:

B Ammon Chlorid.	gr. 20
Ext. Glycyrrhizae Liq.	5j
Syrup Tolu	3j
Aq Chlorof. ad	3ss

The writer's experience with Pot. Iod. in India is that it often causes iodism; it is unsuitable in tuberculosis.

PLACES WHERE THERE ARE TUBERCULOSIS INSTITUTIONS IN INDIA

Abbottabad	Bulandshahr.	Hukeri Road
Ahmedabad	Burdwan	Hyderabad-Deccan.
Ahmednagar.	Buxar	Hyderabad-Sind.
Ajmer.	Calcutta.	Indore
Alibag.	Calicut	Itki.
Aligarh	Cawnpore.	Jadabpur.
Alizai	Chaibasa	Jaipur
Allahabad.	Chapra	Jalpaiguri
Almora.	Chhindwara	Jambhugoda.
Alwar	Chittagong	Jammu.
Ambala.	Coimbatore	Jamnagar.
Amraoti.	Comilla	Jessore.
Amritsar.	Cooch-Behar	Jhansi.
Anand.	Dabirpura	Jherruck.
Arogyavaram.	Dacca.	Jodhpur
Arrah.	Dadar (N W F P).	Jubar
Bahawalpore.	Dalkeith (Panchgani).	Jubbulpore
Balasore.	Daltonganj	Jullundur.
Bangalore.	Darjeeling.	Kalimpong.
Bangalore Civil and Military Station	Davangere.	Kapurthala
Bankura.	Dehra Dun.	Karachi
Bannu.	Dehra Ismail Khan.	Karla.
Bareilly.	Delhi	Kasauli.
Bari.	Deoghar	Katargaum.
Barisal	Devlah	Khulna.
Baroda	Dharampore	Kohima.
Basti.	Dharampore (Patnala).	Kolar Gold Field.
Belgachia	Dharamsala.	Krishnagar.
Belgaum.	Dholpur.	Kulachi.
Bellary.	Dibrugarh	Kurseong
Benares.	Dinajpur.	Laheria Sarai.
Berhampore.	Ferozepore.	Lahore.
Bettiah.	Gauhati.	Lingampalli.
Bhagalpore	Gaya.	Lucknow.
Bharatpur.	Gethia.	Ludhiana.
Bhavnagar.	Gonda	Lunawada.
Bhopal	Gorakhpur.	Madar.
Bhowali.	Guntur.	Madras.
Bhuj.	Hafong.	Madura.
Bijapur.	Hazaribagh.	Mainpuri.
Bikaner.	Hooghly.	Mandi.
Bombay.	Howrah.	Mangalore.
Borsad		
Budaun.		
Budge-Budge.		

Places where there are Tuberculosis Institutions in India—*con.*

Manipur	Parachinar.	Shillong.
Mardan.	Parcel.	Sholapur.
Masulipatam.	Pasighat.	Siakhot.
Meerut.	Patna.	Simla.
Midnapur.	Pendra Road.	Sitapur.
Mirpur Khas.	Perambur.	Srinagar.
Mokolchung.	Perundurai.	Sukkur.
Monghyr.	Peshawar.	Sultanpur.
Montgomery.	Pooná.	Surat.
Moodbidri.	Pudukkottai.	Suri.
Moradabad.	Purnea.	Sylhet.
Morvi.	Purulia.	
Motihari.		Talegaon (Dabhade).
Multan.	Quetta.	Tambaram.
Muttra.		Tangmarg (near Srinagar).
Muzaffarnagar.	Raipur.	Tanjore.
Muzaffarpur.	Rajamundry.	Tank.
Mymensingh.	Rampur.	Tipperah.
Mysore.	Ranchi.	Trichinopoly.
	Rangpur.	Trichur.
	Rao.	Trivandrum.
	Rawalpindi.	
	Royapettah.	Udayagiri G.
	Sadiya.	Vellore.
	Saharanpur.	Vengurla.
	Sambh.	Vizagapatam.
	Sangrur.	
	Santrampur (Sant State)	
	Sarnath.	Wanlesswadi
	Secunderabad.	Wardha.
	Scrampur.	
	Shikarpur.	Yervada.
Nadia.		
Nagercoil.		
Nagpur.		
Nasik.		
Nasik Road.		
Nellore.		
New Delhi.		
Noakhali.		
Nowgong.		
Pabna.		
Palamcottah.		
Panchwau.		

PURPURA (*See also Haemophilia.*)

PRIMARY OR IDIOPATHIC PURPURA.—This is associated with excessive permeability of the capillaries and a shortage or absence of blood platelets, but whether the latter is due to decreased formation in the bone marrow, increased destruction by the spleen, or increased expenditure in "patching up" damaged capillaries, is not yet certain.

In the *mild* form of the disease there may be only a few purpuric spots under the skin or an occasional haemorrhage from a mucous membrane, and examination of the blood generally shows some decrease in the platelet count; the condition is usually chronic, with exacerbations.

TREATMENT.—Splenectomy is indicated if the condition is not improving. Local measures consist in the application to bleeding surfaces of snake venom (e.g., *Stypven*), *Thrombin* (P.D. & Co.) or *Coagulen Ciba*. If these are unobtainable, draw off 5 c.c. of blood from a healthy person, soak a swab in it and apply it to the bleeding surface. Adrenaline also is used largely, but in the writer's experience is not uniformly successful; indeed, the often-condemned *Tinct. Ferri Perchlor.* may succeed when adrenaline fails, but is not so

good as the methods advised above. Autohaemotherapy by the intramuscular injection of 10 c.c. of the patient's own blood may also be successful.

SEVERE PURPURA.—With multiple and repeated haemorrhages this is treated by blood transfusion, followed, when the patient is fit enough, by splenectomy.

Do not persevere with palliative methods until the patient is moribund, but give a blood transfusion when in doubt.

SECONDARY PURPURA.—This is a symptom, generally of ill omen, in some other severe disease such as cancer, nephritis, infective endocarditis, miliary tuberculosis, yellow atrophy of the liver, cerebrospinal meningitis, aplastic anaemia, leukaemia, typhus, septicaemia, haemorrhagic smallpox or haemorrhagic measles. Haemoplastic remedies such as blood transfusion, Haemoplastin, Coagulin Ciba, snake venom, calcium, etc., may be given, but are unlikely to be successful if the causative disease is already killing the patient; if, however, the causative disease is a septicaemia, vigorous chemotherapy is called for.

In sensitive persons purpura occasionally develops after certain drugs, of which quinine, gold, aspirin, iodides, arsenic and Sedormid (allylisopropylacetylurea) are examples. The purpura usually disappears when the drug is stopped.

Shortage of vitamin C (scurvy) or vitamin K (melaena neonatorum or in jaundice) may cause purpura, which may also be seen in any case of general malnutrition. The remedies are obvious.

Henoch's purpura, in which haemorrhage takes place into the bowel, may closely mimic intussusception; like purpura rheumatica it is probably an allergic condition, and is treated by injections of calcium and adrenaline.

PYELITIS

This condition is often called *B. coli* pyelitis, although this is not the only cause.

It is less common in men than in women (especially when pregnant) and children (in whom it may cause high fever with but few localizing symptoms). It is generally associated with constipation and sometimes with some other disease or debilitating condition; local conditions such as stone, stricture or enlarged prostate must never be overlooked, and the presence of piles or anal fissure is not uncommon. Finally, in an intractable case think of urinary tuberculosis. In all cases a fresh mid-stream or catheter specimen should be examined both macroscopically and microscopically.

TREATMENT.—If there is no associated condition such as those just mentioned, the treatment is by alkalis, laxatives and sulphonamides. Very occasionally (the writer has seen one case) a pure *B. coli* infection is resistant to sulphonamides but is cured by mandelic acid treatment.

For alkalinizing the urine and relieving strangury the following is excellent:

R Sod. Bicarb }	..	..	..	..	aa gr. 30
Pot. Cit. }	..	..	..	..	5j
Tinct. Hyoscyami	..	..	..	..	℥ 5
Tinct. Belladonnae	..	..	..	..	5j
Inf. Buchu ad	..	..	..	..	5j
Sig. 3j q 4 h.					

The dose of hyoscyamus and belladonna is halved after 48 hours.

At the same time sulphadiazine, two tablets (1 gramme) are given every four hours for two days, followed by one tablet four-hourly for five days.

The bowels are kept open by small repeated doses of a laxative, e.g., ten minims of Cascara Evacuant or 20 grains of Pulv. Glycyrrhizae Co. three times a day; the patient should drink plenty of bland fluids such as water or barley water, and must avoid alcohol. If there is fever he is treated in bed.

When mandelic acid therapy is required Mandelix (ammonium mandelate), Mandecal (calcium mandelate), or other similar preparation is given in two-drachm doses every four hours; the drug is usually supplied with full directions, some ammonium chloride capsules for use if required and an outfit for estimating the acidity (pH) of the urine.

The rare intractable case not due to some added local cause such as stone or tubercle may be cured by ureteric catheterization and lavage, the catheters being left in place for 24 hours to permit drainage of the renal pelvis.

The *Bacillus coli* is not affected by penicillin.

PYORRHOEA

Although this much-exploited condition is not the deadly disease that the more terrifying advertisements for tooth paste would have us believe, it is an objectionable and debilitating condition and one that should always be carefully looked for when a septic focus is suspected or the patient has foul breath.

PREVENTION.—This is best carried out by reasonable oral cleanliness, the adequate intake of vitamins, particularly vitamin C, vitamin D and vitamin A with calcium, and finishing each meal with a natural cleansing agent such as fruit. In India, malnutrition, lack of cleanliness and particularly the chewing of "pan" are the great causes of pyorrhoea.

TREATMENT.—This should be carried out by a dentist; visible pockets should be slit up and drained. Many cases of gingivitis are due to the infection with Vincent's spirillum, the best local treatment for which is the application of N.A.B. or similar arsenical powder or solution, or penicillin.

Whenever possible, swabs and cultures should be made both for identification and for vaccine-making purposes. X-ray pictures

should also be taken as they are the only means of finding how far the disease has extended.

Local applications are innumerable, the most effective being penicillin 100,000 units with 30 grains of sulphathiazole; others are the dramatically advertised tooth pastes already mentioned, hydrogen peroxide, chromic acid (never to be used except by a dentist), nicotinic acid, sodium ricinoleate, emetine and walnut juice.

Loose teeth should be removed.

PYROGEN-FREE WATER—See Anaphylaxis.

Q FEVER—See Typhus Fever.

QUINSY—See Tonsillitis.

RABIES AND ITS PREVENTION

(In the following article free use has been made, with the author's permission, of Lieut.-Col. H. W. Mulligan's pamphlet on the subject, he has also kindly revised the script.)

MODE OF INFECTION.—Until conclusive evidence to the contrary is available it must be assumed that contact between the fresh saliva of any rabid animal (including man) and the tissues of the body other than unbroken skin constitutes a potential exposure to the risk of developing rabies. Man is most commonly infected through the bite of a rabid dog. The bite of any other rabid animal must also be regarded as potentially infective. The bites of herbivorous animals such as horses, sheep and cattle are less dangerous than those of other rabid animals, but it is not justifiable to withhold treatment from persons exposed to the risk of infection in this way. All jackal bites must be regarded as rabid for two reasons; no jackal will bite a man unless it is rabid, and jackal bites are even more heavily infected than dog bites. *Direct infection* may also occur if the saliva of a rabid animal comes into contact with broken skin, as may occur, for example, from licks on open cuts, sores, abrasions or scratches. *Contact between infective saliva* and chapped hands or scratched insect bites may be sufficient to cause infection.

There is some doubt as to whether rabies virus can gain entry to the body through *intact* mucous membrane or through healthy conjunctiva, but should either of these surfaces be abraded infection may occur. It is so difficult in practice to be sure that surfaces such as conjunctiva or mucous membranes are intact that it is a safe working rule to regard contact between such surfaces and infective saliva as a potential exposure to the risk of acquiring rabies.

The liability to contract rabies is directly proportional to the amount of rabies virus implanted, and to the chances of its survival. The risk is very much greater in persons who have actually been bitten by a rabid animal than in those who have merely been licked on cuts or abrasions. The greater the laceration of the tissues and the deeper and more numerous the wounds, the graver is the risk because the amount of virus implanted is likely to be greater and the chances of destroying it by cauterization, washing or

disinfectants are considerably diminished. Similarly, bites on the bare skin are six times more dangerous than those through clothing because clothing tends to absorb a considerable amount of infective saliva which would otherwise be carried into the wound.

Indirect Infection.—The risk of indirect infection is usually remote, but there are several cases on record in which the infection was apparently caused in this way. Two instances may be quoted.

A dog suffering from rabies was restrained by a chain which became contaminated with saliva. After the dog had been killed and removed a soldier was sent to fetch the chain and scratched his hand with it. He did not receive any treatment and died two months later from rabies. The owner of the dog was bitten but he received treatment and survived.

A boy was bitten by a rabid dog and his trousers were torn by the bite. His mother, who had never seen the dog, pricked her finger with the needle which she was using to mend the tear. She did not receive treatment and died from rabies while the boy, who had been treated, survived.

The virus of rabies when deposited on inanimate objects does not retain its vitality and infectivity for long and it is readily destroyed by light, heat and disinfectants. Consequently, it is unnecessary to destroy clothing, carpets, furniture, etc., merely because they have been contaminated by the saliva of a rabid animal. If soaked in disinfectant and put out in the sun to dry the virus will be destroyed; the articles subsequently may be washed, cleaned or reconditioned in any appropriate manner.

THE INCUBATION PERIOD OF RABIES IN MAN.—The shortest and the longest incubation periods of which we have reliable information are 10 days and 3 years respectively. As a general rule it may be said that the incubation period is from one to three months.

The situation of the bite or bites inflicted is an important factor in determining the incubation period. It is believed generally that rabies virus travels from the site of implantation along the nerve trunks to the brain. This would suggest that implantation of the virus near the brain would be associated with a shorter incubation period since the distance to be traversed would be shorter. While it is well established that bites on the face, head and neck are more dangerous than those on the trunk or extremities, it must be remembered that such bites are always on the bare skin and that they are usually more severe than bites elsewhere because they are almost invariably caused by large and ferocious animals. There are, therefore, other factors to be considered besides proximity to the brain.

Wehster mentions a series with the following average periods of incubation:

Face	..	30 days
Arm	..	40 days
Leg	..	60 days

PREVENTION.—

Cauterization.—One of the most effective means of preventing rabies is to cauterize the wounds as soon as possible. If carried out within two hours of the time of biting this measure is of great value. The longer the interval between the time of biting and the application of the cauterizing agent the less effective will this method be and it is considered generally that it is ineffective after the lapse of 48 hours.

The cauterizing agents recommended, in order of preference, are:

- (1) Concentrated (fuming) nitric acid;
- (2) Pure carbolic acid;
- (3) The actual cautery when neither of the above is readily available. In the absence of special apparatus a needle or other metal instrument heated to a dull-red heat may be used.

Before applying the cauterizing agent, the wound or wounds should be cleansed with some antiseptic lotion and thoroughly dried. It is important that the agent used should gain access to all parts of the wound and in order to ensure this it may be necessary to incise the tissues in the case of punctured or other deep wounds. There should be no hesitation in applying fuming nitric acid to wounds on the face. Such wounds are particularly dangerous and the fear of disfigurement need not be a deterrent since the application of the acid will result in little, if any, additional scarring.

ANTI-RABIC INOCULATION.—It may be extremely difficult to decide whether to inoculate a patient or not; owing to the danger of post-treatment paralysis it is not justifiable to institute a course of treatment with anti-rabic vaccine unless there is reasonable evidence that the patient is at risk. If it is considered that the risk of developing rabies is as great as the chances of developing "paralytic accident" then the obvious course of action is to institute treatment.

Examination of an infected animal's brain generally shows Negri bodies, but just as in the case of malarial parasites in the blood, inability to find them does *not* exclude the possibility of rabies with absolute certainty.

Now the saliva of an infected animal is infective only while it has symptoms and for a maximum of six days before these appear; death occurs within four days of the appearance of symptoms; six and four make ten—therefore, if an animal is alive and well ten days after biting a person, that person *cannot* have been infected with rabies by that bite. It will also be seen that if the animal shows no symptoms after six days there are solid grounds for optimism, but not enough to justify one in stopping the inoculations.

The immense importance of tying up and observing the animal, and of not killing it will now be realized, because if the animal is alive and well ten days after biting the patient treatment can be withheld or discontinued with absolute safety.

If the bite is on the face inoculation should be begun at once and

can be stopped if the animal is well after ten days, but in the case of the limbs it is safe to wait for ten days, unless the bites are exceptionally severe.

Patients undergoing a course of treatment may lead a normal life but should not indulge in violent exercise; alcohol is best avoided, but is not harmful in small quantities. Many patients feel run down, so a change of climate afterwards may be beneficial. Pain may be treated with fomentations, calcium and aspirin. Latent malaria may become manifest and will respond to the usual treatment—the anti-rabic inoculation should not be stopped.

Period of Protection.—This is generally reckoned at three months, but if during that period the patient should be so unfortunate as to receive a probably infected bite nearer the head or of greater severity than that for which he received the previous course, a course appropriate to the fresh lesion should be given.

Contra-Indications.—Unless the patient is dangerously ill from some other disease there is no contra-indication. Pregnancy is not a contra-indication. If a patient with a history of a possibly infected bite applies for treatment weeks or even months afterwards, it should be given.

Stocks of vaccine are obtainable from many civil and military hospitals in India and Burma. If vaccine is not obtainable locally a telegram should be sent to the Pasteur Institute, Coonoor, Shillong or Rangoon, to the Central Research Institute, Kasauli, or to the Haffkine Institute, Bombay. All these institutions also give most valuable and helpful advice in cases of doubt or difficulty.

"PARALYTIC ACCIDENT".—This has a mortality of 25%; it occurs about once in nine thousand cases and usually begins about a fortnight after the beginning of treatment, the recorded extremes being 11 and 30 days. Treatment is therefore usually complete but if not, it should be stopped and not completed even after recovery from the paralytic accident.

"The symptoms are usually mild and transient. Tingling and numbness, and weakness of the legs may pass off in a few days. Facial paralysis may last for a week or two. Transient blindness with eventual complete recovery has been noted. The severe cases have a sudden onset with severe pain in the limbs, rapid development of paralysis of the legs, followed by bladder and rectal trouble and sometimes progressing to paralysis of the upper limbs and respiratory muscles, and death. The progress of the paralysis may be arrested spontaneously at any stage and gradual recovery follow, but there may be later anxiety from bed sores and bladder trouble. The Landry type of rapid ascending paralysis may closely simulate hydrophobia".

Treatment.—There is no specific treatment. Prevention of bed sores and prevention of urinary infection (if catheterization becomes necessary) are important. The use of the 'iron lung', if available, might be considered if the paralysis appears likely to spread to the respiratory muscles. Prognosis should be guarded". (Webster.)

RABIES IN MAN

EARLY SYMPTOMS.—One of the earliest symptoms of rabies is a feeling of uneasiness and a dread of the impending onset of the disease. Headache and insomnia are often complained of before the onset of more objective symptoms. A common early symptom is pain at the site of the bite even in cases in which the wound or wounds are completely healed. There may be twitching of, or a feeling of heaviness in the affected limb. A moderate degree of fever is usually present and may occur at an early stage. Another symptom of rabies which may appear early is spasm of the muscles of deglutition when the patient attempts to swallow food or water. At first the spasm is insufficient to prevent the patient swallowing if he is encouraged to do so. The symptoms mentioned above are usually apparent within 24 hours of the onset.

LATER SYMPTOMS.—Within a few hours of the appearance of the spasm of the muscles of deglutition mentioned above this symptom becomes markedly accentuated. The spasms become so intensified that all attempts to swallow fluids are unsuccessful, though, for some unexplained reason, the patient may still be able to swallow solids. At a later stage the mere sight or sound of water may be sufficient to precipitate spasms and swallowing may become quite impossible. The patient now becomes highly intolerant of external stimuli such as a sudden noise, a bright light or a stream of cold air. Exposure to such stimuli may bring on general convulsions. Respiratory distress is a common symptom and the difficulty in breathing of which the patient frequently complains is probably due to commencing paralysis of the diaphragm. Up to this stage the patient will have been mentally alert and fully conscious of the gravity and distressing nature of his condition. As a rule there is fairly profuse salivation and as the patient is unable to swallow he is prone to expectorate freely, a practice which is not without danger to his attendants. Loss of weight is usually a striking feature of rabies and there is perhaps no other disease in which wasting occurs so rapidly. The rapidity with which emaciation proceeds is out of all proportion to the duration of the illness or to the inability of the patient to swallow. In the later stages of the disease the slightest stimulus may precipitate a maniacal frenzy. This symptom is by no means constant and, in fact, is rarely seen in educated patients. When it is present, the patient may scream or shout and will often struggle with alarming violence when attempts are made to restrain his efforts to do physical damage to himself or his attendants. With or without a preceding maniacal stage a rapidly increasing paralysis of the whole body sets in. Not uncommonly the inability to swallow may cease as general paralysis commences and the patient may ask for and may succeed in swallowing fluids. General spasms affecting the whole body may supervene and there may be vomiting of material resembling coffee grounds. The spasms are often accompanied by screams, especially in children, and death usually occurs during one of these convulsions.

The duration of the illness from the onset of early symptoms to death is usually from 2 to 3 days, but it may be protracted to 5 or even 6 days in exceptional cases. Patients who have not received anti-rabic treatment generally succumb within 48 hours.

The symptoms of rabies in man by no means follow the course indicated above in all cases. Death may occur early from cardiac failure or during a convulsion when this symptom occurs early in the course of the disease. In comparatively rare instances paralysis of the lower extremities and of the bladder may appear before spasms of the muscles of deglutition and in such cases death usually supervenes within 48 hours of the onset.

DOSAGE OF VACCINE:

This is as follows:

CLASS I—2 c.c. for 7 days (Adults and Children).

- (a) Licks, including indirect contact with saliva, on definitely remembered fresh cuts or abrasions on all parts of the body except on the head, face, neck or fingers.
- (b) Licks on the intact mucous membranes of the mouth, nose, anus or genitals or on the conjunctiva.
- (c) Bites or scratches on all parts of the body except the head, face, neck or fingers, which have raised the epidermis but not definitely drawn blood.
- (d) Persons who have drunk the unboiled milk of rabid animals.

CLASS II—5 c.c. for 14 days (Adults, and Children weighing more than 20 lb.—Infants weighing less than 20 lb. receive 5 c.c. for 7 days only).

- (a) Licks on definitely remembered fresh cuts or abrasions on the fingers.
- (b) All bites and scratches on the fingers which are not lacerated, not more than $\frac{1}{4}$ in. long and have not penetrated the true skin.
- (c) Bites and scratches on all parts of the body except the head, neck, face or fingers which have definitely drawn blood, but excluding bites which are five or more in number or in which extensive laceration has occurred.

Note.—Any patient coming into this category who is 14 or more days late in commencing treatment will receive the treatment laid down for **CLASS III** cases.

CLASS III—10 c.c. for 14 days for adults, and for children weighing more than 70 lb.

5 c.c. for 14 days for children weighing between 70 and 20 lb.

5 c.c. for 7 days for children weighing less than 20 lb.

- (a) Licks on definitely remembered fresh cuts or abrasions on the head, face or neck.
- (b) All bites or scratches on the head, face or neck.

- (c) Bites or scratches on the fingers which are lacerated, more than $\frac{1}{2}$ in. long or have penetrated the true skin.
- (d) All bites penetrating the true skin and definitely drawing blood when these are *five or more in number in all*.
- (e) All bites on any part of the body causing extensive laceration.
- (f) All jackal and wolf bites and licks.

Note.—When in doubt give a full course of treatment.

The inoculations are generally given subcutaneously, beneath the skin of the abdomen. Needless to say, all aseptic precautions are observed. The least painful way of giving the inoculation is to have a really sharp needle, to lift up a fold of skin between the left forefinger and thumb, and to thrust the needle in quickly at right angles to the skin. Then give the injection fairly rapidly, and withdraw the needle quickly. Attention to these points is important because not only are the injections repeated, but many of the patients are children. If calcium is given by the mouth throughout the course some of the local tenderness and itching may be prevented. Certain patients feel debilitated and some sleep badly, but such cases usually respond to the usual remedies.

THE DIFFERENTIAL DIAGNOSIS OF RABIES IN MAN.—

Once the symptoms of rabies have become well established no difficulty should be experienced in coming to a diagnosis. There are, however, certain other conditions which might be confused with rabies, particularly if there is a history of possible exposure of the patient to rabies infection.

Hysterical patients may develop a condition simulating rabies, commonly known as pseudo-rabies, particularly if they happen to have seen a case of genuine rabies. In such cases the spasm produced by attempts to swallow differs from that which occurs in true rabies in that when the patient is given water he does not jerk his head back in the characteristic manner but ejects the fluid without making any real attempt to swallow. Failure of the disease to progress rapidly to a fatal issue will clear up the diagnosis.

Tetanus is the disease most likely to be confused with rabies, especially if the possibility of exposure to rabies infection is admitted by the patient. The tonic contraction of the masseter muscles which is so characteristic of tetanus is never present in rabies. In tetanus there is usually a fairly recent wound whereas in rabies the wound is usually completely healed. In Datura poisoning the pupils are widely dilated.

THE TREATMENT OF DEVELOPED RABIES IN MAN.—

As the disease is most agonizing and one hundred per cent fatal, no attempt should be made to prolog the unfortunate patient's life once the diagnosis is established beyond all possible doubt. Of no disease is the saying "Thou shalt not kill, but do not strive officiously to keep alive" more true.

The patient should be put in a quiet room and given an injection of half a grain of morphia with $\frac{1}{16}$ gr. curarine chloride, the latter

to control spasms. If he is not asleep or at least comfortable at the end of half an hour give half the above dose; repeat it every half hour until unconsciousness or comfort supervenes and go on repeating it every time there is a sign of returning symptoms. The patient is kept in this state until he dies, usually on the third or fourth day. If he is inclined to be maniacal, an intravenous barbiturate should be given in full dosage, the first quarter being given rapidly. If this medication is impossible, give more morphia or give chloroform, but beware of the patient's saliva. It may be argued, "Why not give the patient 20 grains of morphia and have done with it?" The answer is that occasionally a wrong diagnosis is made.

PROTECTION OF ATTENDANTS

The more the patient is "doped" with ample doses of powerful drugs the less risk there is of his becoming maniacal and scratching, biting or spitting at his attendants; we thus have another powerful and equally humane reason for keeping the patient as unconscious as possible during this, his last, illness.

Gloves, gowns, masks, footwear and spectacles should be worn by the attendants, and if there is any question of their having been infected much the same principles apply as in the case of the dog. After the patient's death all fomites and utensils should be put into a bath of phenyle for 12 hours, then washed and dried in the sun—it is unnecessary to burn them.

RABIES IN THE DOG

The most characteristic feature of canine rabies is the *short duration of the illness followed by death*. In all cases of death in dogs after an illness of less than 4 or 5 days the possibility of rabies should be considered unless death is patently due to other causes. It must also be remembered that pet dogs may show none of the symptoms about to be described, but may just die of rabies quietly after an illness of 4 or 5 days.

Two forms of rabies are commonly recognized in the dog, namely, "furious rabies" and "dumb rabies". The former, as the name implies, is usually associated with extreme excitability and ferocious behaviour on the part of the dog, whereas in the latter signs of fury are inconspicuous or absent. It is not possible to draw a hard and fast distinction between these two extremes, and almost any intermediate condition may be encountered.

EARLY SYMPTOMS.—The first symptom noted may be that the dog shows a disinclination to take his food. This symptom may be accompanied or preceded by nervous symptoms such as restlessness or hallucinations, though these may be absent in cases of "dumb rabies". Restlessness may, especially in a well-cared-for dog, take the form of increased affection, but is more usually apparent in the form of aimless wandering or by a tendency to become sulky or to hide in dark places. Hallucinations are usually manifested by the dog's rushing or snapping at imaginary objects. Frequently there is a moderate degree of fever but this is neither constant nor characteristic. Redness of the conjunctivae is usually

present and may be pronounced. The symptoms so far described appear early.

LATER SYMPTOMS.—At a later stage the disinclination for food may give place to a perverted appetite and the dog may exhibit a pronounced tendency to eat filth and garbage or to chew up its bed and bedding. Unusual excitability accompanied by exaggerated responses to stimuli may become intensified until a state of fury is reached. The dog will then snap at or destroy inanimate objects and will attack and bite other animals without provocation. Well-kept dogs will not, as a rule, attack their owners, but pariah dogs are liable to become particularly ferocious and will make unprovoked attacks on anything or anybody that comes in their way. The attacks of a rabid dog are usually unaccompanied by the growls which characterize attacks by a normal dog. Salivation is usually increased and may be very profuse. The saliva is of increased consistency, and may be frothy. Paralysis appears at a relatively late stage and may give rise to a number of characteristic symptoms. Partial paralysis of the vocal cords may cause a striking change in the dog's bark which is easily recognized by the owner. Paralysis of the masseter muscles may result in the dog's mouth hanging open continuously (dropped jaw). Paralysis of the muscles of deglutition may prevent the dog from swallowing properly and this often leads the owner to suspect that there is a bone stuck in the dog's throat. Paralysis of the motor muscles may not occur until late in the disease, and usually appears first in the hind legs. This paralysis may spread later to other parts of the body so that the dog lies in a helpless condition. Generalized paralysis is followed by convulsions which usually lead to death within a few hours. In young dogs convulsions may appear early.

At no stage of the disease does the dog display any fear of water.

DIFFERENTIAL DIAGNOSIS.—Distemper, a common disease of dogs, may readily be confused with rabies. The ordinary catarrhal distemper may simulate the early symptoms of rabies, but the absence of complications, the restriction of the symptoms to the mucous surfaces of the eyes, nose and throat, and the failure of the disease to proceed rapidly to a fatal termination will clear up the diagnosis. Intestinal distemper is not likely to be confused with rabies since it commences with diarrhoea associated with the passage of dark-coloured motions sometimes tinged with blood and mucus. In both the above forms of distemper there is usually some degree of fever. Meningeal distemper is a later stage of the catarrhal distemper mentioned above. There is a purulent discharge from the eyes and nose and paralysis commencing in the hind legs may later become general. Symptoms of cerebral irritation associated with exaggerated responses to stimuli sometimes occur and make the differential diagnosis from rabies very difficult. The duration of the illness is, as a rule, considerably longer than in the case of rabies.

ANTI-RABIC TREATMENT FOR DOGS

All privately owned dogs should be kept protected by regular courses of anti-rabic vaccine. This may be started at the age of three months, but younger puppies may be given the vaccine if the owner wishes.

Re-inoculation may be carried out after six months the first time, and then at intervals of a year. It must be emphasized that anti-rabic vaccine is much more valuable as a preventive if administered before the dog is exposed to infection.

Dogs already exposed to the risk of rabies infection.—Dogs which have been severely bitten, or which have been bitten on or near the head, by a known rabid animal, should be destroyed. If the bites are not severe and are not on the head the chances of saving the animal by treatment are reasonably good, provided treatment is commenced without delay. It must be borne in mind, however, that the bitten animal is liable to develop rabies at any time up to six months from the time of exposure, whether inoculated or not, the period of greatest liability being the first three months. It must rest with the owner to decide whether economic or sentimental reasons are sufficiently strong to outweigh the possibility of undesirable consequences, the moral responsibility for which will be his. When there are children in the house no risks should be taken and it is wiser to have the animal destroyed. If the owner decides not to destroy the dog the wounds should be cauterized and a course of anti-rabic vaccine should be commenced immediately. The dog should be segregated and should be kept on a chain or muzzled for six months from the time of exposure to the risk of infection. During this time the owner, or attendant, should exercise great care in handling the animal.

Treatment of developed rabies in the dog.—Once the symptoms of rabies have developed in the dog no treatment is of any avail. If, however, any person or persons have been exposed to the possible risk of infection from the animal it should *not* be destroyed.

Dosage of anti-rabic vaccine for dogs.—Two courses of vaccine are issued for the treatment of the dog according to whether the dog's weight is over or under 30 lb. Particulars of the dosage recommended are given in the literature accompanying the vaccine. In indenting for the vaccine it is necessary only to state the weight of the dog for which it is required. The vaccine is well-tolerated and, if properly administered, its use is seldom associated with any appreciable discomfort or other untoward effect.

Method of administering anti-rabic vaccine to dogs.—As in human subjects the most convenient site for the administration of anti-rabic vaccine in dogs is the subcutaneous tissue of the abdominal wall. Full instructions for the administration of the vaccine to dogs or other animals are given in the literature issued with each course of animal vaccine.

Sequelae of anti-rabic treatment in dogs.—A condition analogous

to post-treatment paralysis in human patients is occasionally observed in dogs. Symptoms usually become apparent about a week after the completion of treatment. There can be marked hypersensitivity of the skin over the dorsal region and the animal may develop an unsteady gait. Paralysis of the hind limbs may develop followed by complete paralysis at a later date. These symptoms may be accompanied by increased excitability of the dog. In most cases recovery takes place within about a week. There is no specific treatment for this condition.

RABIES IN OTHER ANIMALS

Since rabies is a disease to which all mammals are susceptible, it would obviously be outside the scope of this article to attempt to describe in detail the symptoms in each. A brief reference will, however, be made to a few of the animals with which man is most likely to come in contact.

RABIES IN JACKALS

The symptoms of rabies in the jackal are very similar to those which have already been described in some detail in reference to the dog. Jackals are highly susceptible to rabies and are an important reservoir of the disease in this country. The jackal is naturally a retiring animal and *it may be assumed that a jackal which makes an unprovoked attack is rabid*. Experience has shown that, so far as human patients are concerned, the bite of a rabid jackal is attended with a high degree of risk of infection, and it is customary, therefore, to give all human patients bitten by a jackal the maximal dosage of anti-rabic vaccine.

RABIES IN CATS

Cats infected with rabies show a strong desire to bite and scratch and are particularly prone to stray from their usual abode. The injuries caused by rabid cats are particularly dangerous since they often jump up and attempt to scratch or bite their victims on the face. A rabid cat does not exhibit any fear and will readily attack a dog. Next to dogs and jackals, cats are probably the most frequent agents through which rabies is transmitted to man. As in the dog, the voice of a rabid cat may be characteristically altered and hoarse.

RABIES IN CATTLE

Cattle are more commonly affected by "furious" than by "dumb" rabies. Rabid cattle are less prone to bite than members of the canine tribe and they exhibit their fury principally by butting with their horns and stamping with their feet. They may dig up the ground in this way, sometimes exerting such violence that their horns are broken. There is a peculiar alteration of the voice and sometimes bellowing or roaring is continuous. There is excessive secretion of saliva. Paralytic symptoms appear first in the hind quarters and may later become general. Emaciation may be extreme.

Other symptoms sometimes observed are intense itching of the skin, colic, and persistent constipation, and when these occur the diagnosis may at first be somewhat obscure.

RABIES IN HORSES

Rabid horses may remain in a dazed state until paralysis sets in but more commonly they show symptoms of "furious" rabies. In the latter instance they are very difficult to control and may do much damage to themselves, their stables and attendants. Some may be definitely aggressive to man and may exhibit an irresistible desire to kick and bite. Horses may bite inanimate objects with such violence that they break their teeth and some will even mutilate their own bodies by tearing their skin or appendages such as the genital organs. Perverted appetite is also seen in some cases. Increased sexual excitement and desire to micturate are prominent signs of equine rabies. When paralysis of the muscles of deglutition sets in the food is returned through the nose. Later, muscular spasms and convulsions of different parts of the body appear and finally general paralysis sets in with, at first, the usual staggering gait. Death usually occurs in from 4-5 days of the onset of symptoms and in certain cases may be caused by apoplexy as early as twenty-four hours from the start of the disease.

RABIES IN SHEEP AND GOATS

The symptoms of rabies are essentially the same in sheep and goats. At first there is marked restlessness associated with intense itching at the site of the bite which the affected animal continually gnaws and licks and attempts to denude of wool. All signs of timidity are lost and rabid sheep and goats may even become mildly aggressive. A peculiar fixed or staring expression is often noted. This stage is soon followed by weakness and paralysis of the hind quarters with, later, general paralysis. The tone of the bleat may be distinctly altered. Death occurs within three to six days of the onset of symptoms.

DIAGNOSIS, TREATMENT AND PROPHYLAXIS OF RABIES IN ANIMALS OTHER THAN DOGS.—

The remarks made above in reference to the dog are generally applicable to other animals as regards the diagnosis, treatment and prophylaxis of rabies.

Anti-rabic vaccine may be given to any animal. Appropriate courses of vaccine may be obtained from any Pasteur Institute. The species and approximate age and weight of the animal should be specified. The cost of such courses of treatment varies according to the dosage required. Indents for courses of anti-rabic vaccine for horses, cattle, elephant, deer, etc., are frequently received. The usual dosage and duration of treatment for the species of animals more commonly treated are given below.

<i>Species of animal</i>				<i>Daily dose of Vaccine</i>	<i>Duration of Treatment</i>
Cat				3 c.c.	7 days
Dog	..	.	..	5 c.c.	7 days
Goat					
Sheep	}			10 c.c.	7 days
Calf		..	.		
Deer					
Pony		.	.	20 c.c.	14 days
Bullock	}				
Buffalo		..	.	30 c.c.	14 days
Cow			.		
Horse					
Camel	}	.	.	60 c.c.	14 days
Elephant					

REMOVAL AND PRESERVATION OF BRAINS OF SUSPECTED RABID ANIMALS.—

Diagnosis by microscopical examination of the brain requires the preliminary removal of the brain of the suspected animal and the procedures to effect this important object are described below.

Method of removing the brain of a suspected rabid animal.—The description given below is for the dog, but the method is applicable, with any necessary modifications, to other animals.

Don an old pair of leather gloves and goggles, if possible, as the brain is infective.

- (1) Wash the head of the dog with any disinfectant.
- (2) With a sharp knife cut through the skin in the middle line from the neck to the nose. Reflect the skin on both sides, laying bare the skull. Cut away the fleshy tissue on the skull as far as possible.
- (3) Chisel all round the skull and remove the skull-cap.
- (4) Incise the membranes covering the brain and divide the latter down the centre into two longitudinal halves.
- (5) Lift out each half of the brain separately, severing any nerves or other tissues preventing its removal.

Preservation of the brain.—

- (1) Into the bottom of a large wide-mouthed bottle put a layer of cotton-wool.
- (2) Put the whole or one-half of the brain on this layer in the bottle.
- (3) Fill the bottle completely with rectified spirit, methylated spirit, or 10% formalin in saline.

For an average dog's brain the capacity of the bottle should be two pints, or, as a rough guide, ten times the volume of the brain.

- (4) Cork or otherwise close the lid of the bottle or jar securely and seal with wax.
- (5) Pack in a box with sawdust and *enclose an account of the illness of the animal and the full address of the person to whom the result of the brain examination is to be sent.*

- (6) Send the specimen by passenger train or post to the nearest Pasteur Institute.

RADIUM THERAPY

By radio-activity or the spontaneous disintegration of the element Radium, three kinds of rays are given off: α , β , γ . Alpha rays are helium atoms positively charged. Beta particles are single negative electrons. Gamma rays are not material bodies; they are energy waves like light and X-rays, but of a shorter wavelength. Alpha rays although representing 92% of the energy of radium have practically no power of penetration and are of no therapeutic value. Gamma rays represent 4.8% of the energy; they are very penetrating rays never emitted alone, but always with beta rays, and in passing through the body they give rise to secondary beta rays also of therapeutic value.

The action of radium is similar to that of X-rays. The beta rays, corresponding to soft rays from the X-ray tube, can produce a limited superficial reaction, but are usually cut off by filtration through 0.6 mm. of platinum which absorbs 99.0% of beta particles, so that the effect of the gamma rays alone is obtained and it is the gamma rays which produce the therapeutic changes.

EMANATION OR RADON.—Radium emanation or Radon gas is the first product of the disintegration of radium, the quantity being measured in equilibrium with 1 gm. of radium and known as the "Curie." While it takes radium 1,700 years to lose 50% of its weight, the radio-activity of radon has completely gone in 30 days.

TREATMENT BY RADIUM.—It is most important that the general practitioner should realize that radium treatment is a highly specialized branch of medicine that can only be undertaken by specialists at centres which are equipped for the purpose. At the same time it is essential that he should have a clear conception of the possibilities of radium therapy and be able to co-operate in the preliminary treatment and post-radiation care of the patient.

Methods of Application:

- (1) **CAVITY METHOD.**—The radium is introduced into such cavities as the mouth, rectum, and vagina, either continuously or interruptedly.
- (2) **INTERSTITIAL IRRADIATION.**—The radium is introduced into the lesion to be treated, and the method is spoken of as "needling", which means the systematic distribution of containers, each containing a small quantity of radium, in and around the affected area.
- (3) **SURFACE APPLICATION.**—The radium is distributed on the outer surface of a plaque of paste, wood or sponge rubber and applied continuously or intermittently over long periods.
- (4) **BOMB OR BEAM THERAPY.**—This requires from 1-4 gm. of radium at the cost of approximately £10,000 per gramme. It has the advantages of great powers of penetration,

depth dosage is increased, and an otherwise inaccessible tumour can be treated. Apart from the economic question, it is theoretically the method of choice, and whereas up to now it has not fulfilled expectations further improvements are probable.

THE SCOPE OF RADIUM THERAPY.—Whereas the principal field of use is for malignant disease there are a number of non-malignant conditions which benefit by this treatment which include :

- (1) **SKIN DISEASES.**—Lupus erythematosus which defies all other means; Pruritus with leucoplakia; Keloid, papillomas and naevi especially cavernous naevi, better results being obtained than with any other form of treatment.
- (2) **TUBERCULOSIS.**—Whereas lupus vulgaris of the skin is best treated by heliotherapy, lupus of the fauces and palate is much improved by radium, as also are tuberculous glands.
- (3) **UTERINE DISEASE.**—The haemorrhage of fibroids and intractable chronic metritis will at times react to radium, thus avoiding operation.
- (4) **BLOOD DISEASES.**—Although the ultimate prognosis is bad, radium treatment especially in myeloid leukaemia can cause an improvement in the patient's general condition, with reduction in the number of leucocytes and the size of the spleen.
- (5) **MALIGNANT DISEASE**—In the treatment of cancer, radium is in a state of rapid evolution and progress, so that the methods advocated are continually changing. It is important for the practitioner to realize that in the treatment of cancer there are now two opposing methods—radium and surgery—and it is true that there are classes of cases in which radium or surgery is best adapted; there is a large field in which a combination of the two is the best method.

Dr. Ward considers that radium therapy can be regarded as the method of choice in the following seven groups:

- (1) **EPITHELIOMA OF THE SKIN.**—Radium has a powerful effect on epidermal cancer; of all varieties of rodent ulcer treated at the Radium Institute 77% were cured, and the cosmetic results are superior to those of surgery or X-rays. Carcinoma of the anal canal, hypertrophic growths of the penis, and epithelioma of the vulva are all well treated by radium.
- (2) **CANCER OF THE MOUTH,** jaws, cheek, tonsil, pharynx and nose vary in their degree of malignancy and radio-sensitivity. Some are treated with radium alone, others with a combination of radium and diathermy excision. Cancer of the tongue can be permanently cured by interstitial radiation. As regards glands in the neck, every surgeon of experience knows how disastrous it is to interfere unless complete removal is possible. The best treatment is block dissection plus irradiation.

- (3) **CARCINOMA OF THE UTERUS.**—If the disease is limited to the body of the uterus, surgery gives the best results, but in the case of the cervix more and more cases are being treated by radium, which would previously have been treated by Wertheim's operation, and with increasingly encouraging results more especially when combined with X-rays. It can be said of radium that in treatment of carcinoma of the cervix it has done more to alleviate and prolong life than in any other group of patients with cancer.
- (4) **BREAST CANCER.**—The question of operable cases is not as yet definitely settled, but radical operation, with removal of a wide area of skin and the axillary contents, would appear to be the best with the possible exception of patients with thin flat breasts.
- In inoperable cases even those so far advanced as to have fungating growths and ulcerating surfaces heal and remain healed, the progress being arrested for years. Supraclavicular and axillary glands should never be excised but treated with radium.
- (5) **SARCOMA.**—In melanotic sarcoma radium is useless, and in the case of bone sarcoma and fibro-sarcoma from connective tissue it cannot be said to be satisfactory and X-rays are more generally used. There is more hope in lympho-sarcoma, sarcoma of the tonsil and that common condition in India, sarcoma of the upper jaw.
- (6) **DISEASES OF THE EYE.**—Radium is useful in tumours growing from superficial parts of the eye such as the conjunctiva and cornea, but as a primary measure is not applicable to sarcoma of the choroid and deep orbital tumours.
- (7) **AS A PALLIATIVE MEASURE.**—Radium has its widest range of usefulness in inoperable cases which formerly died in miserable conditions, with foul discharge and profuse haemorrhages, but now succumb in comparative comfort from secondary deposits. Pain is relieved and the patient's general condition improves with a prolongation of life. In carcinoma of the rectum colostomy is often avoided and in cancer of the mouth the dysphagia is relieved.

The practitioner can co-operate before the patient is taken over for treatment by the radium specialist by improving the patient's general condition, starting anti-syphilitic treatment in cases with a positive Wassermann, and, more important, reducing any inflammation and sepsis of a growth, as both these factors considerably reduce radio-sensitivity. Subsequent to the treatment the practitioner should treat the anorexia resulting from the breaking down of the tumour, any local conditions of the skin, remove radon seeds and regularly report the local and general condition of the patient to the Radium Centre; the full effect is usually not seen until two months after the irradiation.

RANULA

This term is usually applied to all cystic swellings of the floor of the mouth. The ideal treatment is to dissect the cyst out completely, but this is extremely difficult on account of the thinness of the cyst walls; remove as much as possible and then allow the cavity to granulate.

RAT-BITE FEVER

This is caused by infection with a short spirillum (*Sp. minus*) through the bite of a rat, ferret or possibly a cat. The incubation period is between 2 and 6 weeks and the disease is ushered in with a rigor. Enlarged glands, pain in the bite and a variable rash occur, and the fever lasts two or three days and is followed by relapses at intervals of a few days.

TREATMENT.—This is by one of the anti-syphilitic arsenicals, 0.45 gramme intravenously once a week for six injections, or by penicillin three-hourly for 48 hours.

RAYNAUD'S DISEASE

In certain people, usually young women, the vessels of the fingers and toes over-contract under the influence of cold; if the cold is severe and the contraction prolonged, gangrene may result.

TREATMENT.—This is by the avoidance of chill by wearing gloves, keeping the hands in a muff or in the pockets, or a change to a warmer climate, e.g. from Quetta to Karachi. Raynaud's disease is said never to occur if the air-temperature is above 52° F.

Drug treatment includes nicotinic acid before or during exposure to cold, parathyroid (gr. $\frac{1}{16}$ t.d.s.), and calcium gluconate or lactate by the mouth or by injection.

SURGICAL TREATMENT.—Sympathectomy or the injection of the sympathetic ganglia with alcohol is a specialized and successful procedure, but is not always permanent. Transfer to a warmer climate is better, and in India is usually possible.

When an attack has occurred it is important not to try to "thaw" the fingers quickly by means of heat, but as in frost-bite they should be allowed to recover slowly.

RECTUM (*See also Anus and Haemorrhoids.*)

Injuries can occur in many ways, among the commonest causes being a hard enema nozzle used by a careless nurse, a fall on a spiked railing, a chair that breaks when sat on, or a gunshot wound. The rectum can also be injured or perforated during a pelvic operation.

The surgeon must satisfy himself on the following points:

- (a) Has the peritoneum been opened? Bleeding from the anus suggests it, shock makes it probable, and lower abdominal tenderness with rigidity makes it certain.

The treatment is to give the patient an anaesthetic, to

examine the rectum carefully, especially the anterior wall, and if there is even a possibility that the peritoneum has been penetrated to open the abdomen. The injury is then repaired and a temporary colostomy made.

- (b) Has the bladder or urethra been injured? Examination of the urethral orifice and the passage of a catheter will settle this point.
- (c) Is there, or is there likely to be, a spreading cellulitis? If so, incisions, anti-gas-gangrene serum and chemotherapy are required. A temporary colostomy, by preventing frequent faecal infection of the wound, is generally advisable.

A foreign body in the rectum should be removed from below when possible, but if there is difficulty it is better to open the abdomen and press it downwards from above; in very rare cases it may be necessary to incise the bowel.

PROCTITIS—Apart from that due to the dysenteries and bilharzia infection, this may be catarrhal, acute or specific.

A common cause of catarrhal proctitis is the habitual use of a laxative, phenolphthalein being perhaps the worst offender. Certain parasites, such as worms or *Lamblia* (*Giardia*), irritating food, frequent colonic lavage, constipation, and a variety of other simple conditions may be the cause. *Trichomonas intestinalis* may be a more frequent cause than is generally suspected and may be the reason for the frequent success of Stovarsol in non-amoebic bowel infections.

Specific infections include tubercle, lymphogranuloma inguinale, gonorrhoea, and syphilis; a severe streptococcal inflammation sometimes occurs in debilitated females.

Bacillary dysentery and gonorrhoea are less common causes than they used to be. Amoebic dysentery produces a proctitis with characteristic diamond-shaped ulcers. Diphtheritic, tuberculous and syphilitic proctitis are also known, and in children threadworms are often found. Bilharzia is, of course, the common cause in Egypt, Central and South Africa, and yaws, which is common in Burma, Assam and certain parts of Central India, may affect the rectum. Finally, proctitis may occur from trauma and the consequent introduction of sepsis, sometimes from an enema nozzle, an operation, or even the passage of hard scybala.

TREATMENT.—Pass a speculum, under an anaesthetic if necessary, and find the cause; a swab should be taken and examined microscopically. When the cause is found it is treated, usually by chemotherapy, but local wash-outs with normal saline, eusol, Milton 10%, or silver nitrate 1:1,000 in distilled water are all useful. If there is much mucus the wash-out should be preceded by a bicarbonate of soda (two drachms to one pint) irrigation.

Prolapse of the rectum has been dealt with under "Anus".

CARCINOMA OF THE RECTUM.—If a rectal examination were made once a year on all people over 50 very few would die of rectal cancer.

Any alteration in the bowel habit of a middle-aged or elderly person calls for a careful rectal examination.

SYMPTOMS.—These are often absent in an early case, but recent "piles" in a middle-aged person, repeated dark haemorrhage, the passage of mucus or a feeling that the patient has not had "a clear motion" are suggestive. Like other cancers, that in the rectum is usually painless in the earlier stages.

SIGNS.—A rectal carcinoma is generally palpable by the finger as a hard mass or ulcer and is visible with a sigmoidoscope. The etiology is unknown, but it may follow a polyp.

PROGNOSIS.—Cuthbert Dukes's careful researches into the pathology of over a thousand cases operated on at St. Mark's Hospital, London, have given us most of our knowledge on this subject. His results may be approximately summarized as follows.

The disease is twice as common in men as in women; 75% of cases occur between the ages of 50 and 70, about 60% are operable when first seen, and of these about 50% are cured by operation. The two operations commonly practised are the abdomino-perineal, and perineal excision.

Dukes divides the growths into the following classes: operative results are also shown.

PERCENTAGE ALIVE 5 YEARS

AFTER OPERATION
Perineal excision Abdomino-perineal

Class	Definition
A	Growth limited to wall of rectum
B	Growth has penetrated rectum but not involved lymph glands
C1	Lymph glands involved but upper haemorrhoidal glands free
C2	Gland involvement includes gland just below ligature on inferior mesenteric artery

82.2	83.9
61.7	62.3
24.8	42.5
9.7	11.9

Thus it will be seen that the abdomino-perineal operation gives slightly better results than perineal resection. Exploratory laparotomy and a left inguinal colostomy are done about a fortnight before perineal excision, but form part of the combined one-stage operation.

A fair summary of current opinion is that perineal excision is suitable for cases of carcinoma in the lower third of the rectum without glandular involvement, but if the growth is higher than this and if the glands are involved, the combined operation should be done.

Radium so far has been found greatly inferior to surgery, its only use being when complete removal of the growth has been obviously impossible.

Dukes makes the further interesting observation that 17% of cases show malignant deposits in the haemorrhoidal veins, but only half of these were found to have metastases in the liver.

POLYPL.—These are common in children and may cause

haemorrhage; they sometimes present at the anus. A point worth remembering is that they often cannot be felt by a gloved finger. The treatment is to ligature the pedicle and remove the polypus. In adults they may precede cancer, so should be removed.

STRICTURE.—Congenital and spasmodic strictures, if not too severe, are best treated by progressive dilatation, otherwise operation will be needed.

The so-called inflammatory stricture is the result of the fibrinosis that normally follows any destructive or chronic inflammation; it may, therefore, occur after operation or even injection for piles; the now discarded Whitehead's operation was particularly apt to be followed by stricture.

Lymphogranuloma inguinale (*g.r.*) is a common cause of inflammatory stricture in the East, but is more common in Burma and the countries east of it than in India itself.

The condition is much more frequent in women, mostly prostitutes, than in men, probably because of the different arrangement of the lymphatics in the two sexes; when it occurs in the male it is likely to be the result of sodomy. Many cases of stricture previously thought to be due to other diseases are now being found to be due to lymphogranuloma.

The treatment of lymphogranuloma is discussed under the heading, Venereal Diseases. The treatment of severe non-dilatable stricture of the rectum is colostomy, although in a few cases local excision may be possible.

Stricture of the rectum also occurs in association with malignant disease

RELAPSING FEVER

The disease is caused by a spirochaete which is easily seen in Leishman-stained blood films taken during the fever.

The method of infection is very like that of typhus. The disease is carried by lice and ticks, so is found in those countries where the people's habits encourage the existence of these pests; it is not common in India, but occurs in the North-West and in Kashmir, where the usual vector is the louse (*Pediculus humanus*), which spreads the disease as follows: the louse feeds on an infected person and after nine days becomes "a bag of spirochaetes which persist throughout its life, but are not injurious to it" (Manson-Bahr). The louse now feeds on an uninfected person, who, irritated by the bite, crushes the louse and so infects himself through the skin, the bite itself being non-infective; there is no intermediate host.

Tick-borne relapsing fever occurs in Persia and North-West India; the method of infection is disputed, being perhaps through the rubbing-in of tick-excrement or perhaps through its bite, but the important points are that the disease is more severe than the louse-borne type, and there are intermediate hosts in the form of rats and mice, so the disease tends to be endemic in certain houses or localities; infection is said to be hereditary in ticks.

PROPHYLAXIS.—This is by disinfection, D.D.T. (10% in alk) being rubbed into the clothes, and a liquid preparation of D.D.T. sprayed over beds and bedding; cresol, heat and boiling are other methods. Strange beds in unhygienic surroundings must be avoided. Prophylactic inoculation with three doses of vaccine, 0.5 c.c., 1.5 c.c. and 2.0 c.c. respectively, at 3-day intervals, produces a useful degree of immunity.

COURSE.—The incubation period is usually about 5 days, but varies between 2 and 14. The severity of the attack is variable, but usually the onset is sudden, with rigor, high fever, headache, aches and pains all over the body, and sometimes epistaxis and vomiting. The first attack lasts about 5 or 6 days and ends by crisis, *after which the patient may be extremely collapsed.*

Relapses vary in number and severity, four or five being usual in the louse-borne type, but as many as fourteen may occur in the tick-borne type. The intervals between relapses vary, but are usually between five and fourteen days.

TREATMENT.—Disinfection of the patient, protection of contacts and general nursing are all of the greatest importance.

N.A.B. or some similar preparation, 0.45 gramme, given intravenously, is specific. The first dose produces a crisis, but should be followed by three more doses at weekly intervals. The drug must *not* be given when the temperature is falling or a natural crisis is imminent. Sometimes the spirochaetes become arsenic-resistant, in which case antimony or gold may be given as well, or, far better, penicillin; this is an alternative drug which has proved of great value and is prompt in its effect.

RENAL CALCULUS } —See Calculi.
RENAL COLIC }

RETENTION OF URINE—See Urine, Retention, Extravasation and Suppression.

RETROPHARYNGEAL ABSCESS

An acute abscess is seldom seen in patients over five years old and it is opened through the mouth; the patient's head is held very low to prevent inhalation of pus with possibly fatal results. A baby may be held up by the heels.

The tongue is depressed and a gag inserted (the smallest size Davis-Boyle gag is excellent); a guarded abscess or cataract knife, that is, one whose blade except the terminal half-inch is wrapped in sticking plaster, is now thrust into the pointing abscess, followed if possible by a sinus forceps and the pus allowed to escape. A suction apparatus is a great help. The operation is followed by chemotherapy.

If ethyl chloride anaesthesia is to be given, the gag must be inserted first, as only the lightest anaesthesia is required and the jaw must not relax.

Rectal paraldehyde, 1 drachm in $1\frac{1}{2}$ ounces of normal saline per stone of body-weight, given $\frac{1}{2}$ to 1 hour before operation, is a safe anaesthetic.

Have a tracheotomy set ready in case of accident.

A threatened abscess usually resolves under chemotherapy.

A *chronic abscess* is invariably due to cervical caries so must on no account be opened through the mouth or secondary infection will occur, with disastrous results.

The abscess should be aspirated through the side of the neck and plaster of Paris applied to immobilize the head.

RHEUMATIC FEVER

Although this disease is considered to be rare in India as a whole, one sees a surprisingly large number of cases of rheumatic valvular disease in any general hospital.

It is estimated that about one-third of the number of patients with rheumatic fever escape damage to the heart, one-third die within ten years, and one-third become invalids.

Rheumatic fever most commonly occurs between the ages of 10 and 25, and is unknown below the age of 2. The essential lesion is the Aschoff's nodule, about the size of a pin's head. It is inflammatory in nature and contracts in time, but pathogenic organisms have not been convincingly isolated from it. It may be caused by the toxins of streptococci inhabiting the nasopharynx and tonsils, but removal of tonsils and adenoids is of doubtful value except when they are obviously unhealthy. In children, however, repeated attacks of tonsillitis are a definite indication for tonsillectomy, not only because they may be the chief manifestation of rheumatic fever, but because there is much evidence that they are often the primary cause of nephritis. They should be removed during a quiescent interval.

TREATMENT.—The chief methods are unchanged, namely, rest and salicylates, chemotherapy so far having proved disappointing.

During the acute stage rest must be absolute, the motto being "The patient must not lift a finger to help himself." This is not easy to carry out and means highly skilled nursing, but the nearer one can approach this ideal the better for the patient's heart.

Now, it is undoubtedly true that many a healthy person has been made a permanent invalid by too much attention and too much rest in bed, so the question arises, when shall these patients be allowed up? The answer is, when the pulse and temperature have been normal for a month, when all sweats and joint pains have ceased, when all rheumatic nodules have disappeared, and, most important of all, when the erythrocyte sedimentation rate is normal. Unfortunately, relapses are common, so must be carefully watched for.

Salicylates.—These have no effect on the pathological process, but they do bring down the temperature and relieve joint pains if

given in sufficient doses; if an equal amount of bicarbonate of soda is given at the same time, toxic effects and digestive disturbances are less. The usual dose is 30 grains of sodium salicylate with 30 grains of sodium bicarbonate 3-hourly until the temperature and joint pains show marked signs of diminishing, generally a matter of a few days, after which the dose is gradually cut down. This must also be done if signs of salicylism such as tinnitus, giddiness, nausea and vomiting develop, but *slight* toxic symptoms indicate that the dosage is adequate. Sudden withdrawal of the drug is most inadvisable as it will be followed by a relapse. The usual practice is to give high doses until all symptoms have subsided and then to put the patient on a maintenance dose of 15-20 grains 3 times a day for some months. Children are given correspondingly smaller doses; some patients tolerate aspirin better than sodium salicylate, but the writer has found it more depressing. Prolonged administration of penicillin in large doses has been reported as successful in some cases.

Painful Joints.—Salicylates internally bring relief, and may be helped by local applications such as Thermogene Wool, or lint spread with glycerin and Ichthyol, lead lotion, belladonna liniment, Liq. Hamamelidis, or 20% mag. sulph. in water.

For permanent effects on the heart, *see* Heart.

RHEUMATOID ARTHRITIS—*See* Arthritis.

RHINITIS—*See* Nose, Diseases of.

RICKETS

This disease is commonest between the ages of 6 months and 2 years. Owing to shortage of vitamin D (calciferol) in the body, calcium is not absorbed, so calcium phosphate, which gives bones their hardness, is not laid down in them.

The shortage of vitamin D may come about in various ways:

- (a) Deficiency in the diet (commonest).
- (b) Deficient absorption, as in coeliac disease, renal disease in childhood, and perhaps in sprue.
- (c) Deficiency of "home-made" vitamin D, owing to lack of light. Ultra-violet rays passing through the skin act on the ergosterol in the subcutaneous fat to form vitamin D (from which the shrewd reader will deduce that sunlight or ultra-violet irradiation is the logical treatment in cases in which, as in (b) above, absorption is deficient; it is also effective, of course, when the shortage is in the diet).
- (d) The intake may be normal, but the vitamin meets with opposition from (probably) the phytic acid contained in certain cereals, of which oatmeal is the chief, from which it can be deduced that large quantities of cereals should never be given to rickety children.

SIGNS.—The chief signs of rickets are due to the softened bones and include bent tibiae, prominent forehead, late closure of anterior

fontanelle (normally closes at 18 months), Harrison's sulci (concavity of ribs below nipples, often exaggerated by the bronchitis and catarrh which are features of the disease), wide epiphyses, best seen, as are also the X-ray changes, at the lower end of the radii, and also seen as "rickety rosary" at the costo-chondral junctions.

SYMPTOMS.—Suspicious symptoms are profuse sweats, flatulence, "podgy" fatness, bronchitis, catarrh, anaemia, delay in teething, attacks of laryngismus stridulus and sometimes convulsions.

TREATMENT.—Give at least 3,000 units of vitamin D per 24 hours for about 3 weeks, after which the dose may be cut down to 1,000 units, which is about the maximal daily requirement of a growing child. With doses of more than 5,000 units (a quarter of a milligram) of pure calciferol a day given over long periods there is a danger of causing calcification of the kidneys, from which several deaths have been reported. The number of units in some of the better known remedies is as follows:

Liquor. Calciferolis <i>B.P.</i>	..	..	3,000 units per c.c.
Liquor. Vitamin D Concentratus <i>B.P.</i>	..	..	10,000 units per c.c.
Ostelin (Glaxo)	..	..	5,000 units per c.c.
High Potency Ostelin (Glaxo)	..	..	50,000 units per tablet
Radiostol (B.D.H.)	..	..	3,000 units per pellet
Cod-liver Oil	..	average	125 units per c.c.
Cod-liver Oil Emulsion	..	..	50 units per c.c.
Halibut-liver Oil	..	..	2,500 units per c.c.
Shark-liver Oil (variable)	..	..	200 units per c.c.
Fresh Milk	..	..	40 units per pint
Fresh Butter	..	..	40 units per ounce

Modern fish-oil preparations are often fortified by the addition of synthetic vitamin D, so the label or pamphlet should be carefully read before the preparation is given.

Calcium.—Calcium gluconate or lactate (5–10 grains t.d.s.) is also given.

Massive Therapy.—This has recently been tried with good results and is particularly suitable for India, where regular attendance at hospital is rare and quick results are appreciated; 600,000 units of vitamin D (equal to 15 milligrams of pure calciferol) are given by the mouth in one dose.

The most suitable preparation would seem to be High Potency Ostelin Tablets (Glaxo), a dozen of which contain the required dose, alternatives are Liquor. Vitamin D Conc., 2 ounces, Liquor. Calciferol, 6½ ounces, or Ostelin, 4 ounces. In all cases check up the dose from the label or pamphlet before giving large doses.

Heliotherapy.—For reasons already given, exposure to the sun's rays (which except in the hills contain very little ultra-violet rays) or exposure to a mercury-vapour lamp is very beneficial in rickets.

Diet.—The diet should contain calcium and vitamin D so the following are beneficial: Fresh milk, Ostermilk or other dried milk with added vitamin D, fresh eggs, freshly cooked meat, liver or fish. Fresh vegetables and fruit contain a good deal of calcium, so

should be given freely. Cereals, especially oatmeal, should for reasons already given, be eaten sparingly.

Finally, shortage of one vitamin usually means shortage of others, as is shown by the old name, "scurvy-rickets," so other vitamins should be given in full therapeutic doses.

OSTEOMALACIA.—Osteomalacia, or adult rickets, is due to the same causes and requires the same treatment. It is particularly common during pregnancy and lactation, when the calcium demand on the mother is very heavy. The pelvic deformities often necessitate Caesarean section.

RIFT VALLEY FEVER

This is a virus disease perhaps akin to a mild yellow fever occasionally conveyed from sheep to man by a mosquito, and occurring in the Naivasba area of Kenya.

The incubation period is about five days and the symptoms are like those of dengue, namely, fever, pains in the back, furred tongue and photophobia, but in addition there is some nausea, sweating and considerable discomfort in the hepatic area. The disease lasts for three or four days; the prognosis is good and treatment is symptomatic.

RINGWORM

RINGWORM OF THE SCALP.—For some reason this is almost unknown above the age of puberty, when, indeed, old infections generally die out; this raises the interesting speculation whether gonadal hormones could be given in doses sufficient to cure the ringworm without causing precocious changes in the patient's body.

DIAGNOSIS.—This is most easily made by ultra-violet light passing through Wood's nickel glass. The hair must be free from grease or Vaseline. In a dark room the infected hairs stand out as a bright fluorescent green, which once seen is never forgotten. For the microscopic test, pull out a few hairs from the suspected area, put them on a slide, add two or three drops of *Liquor Potassae*, put on a cover slip and examine under a $\frac{1}{4}$ -inch or $\frac{1}{8}$ -inch objective with the light well stopped down as for a blood count. The spores are clearly seen in the affected hairs.

TREATMENT.—Complete epilation of the scalp is necessary in order that the anti-parasitic remedy can enter the hair follicles. There are two methods, X-rays and thallium acetate. X-rays must be given by an expert with the greatest care, too small a dose resulting in failure and too large a dose in permanent baldness, which the patient's mother will doubtless consider an even worse failure. As the details are the concern of the radiologist, they will not be given here.

Thallium acetate in correct dosage causes epilation, not quite so complete or so long-lasting as that following X-rays, but usually adequate for the treatment of ringworm. Owing to a few well-advertised fatalities following over-dosage, the method has fallen

into disrepute, undeservedly in the writer's opinion, but the following precautions must be taken.

- (a) The dose is exactly 8.5 (eight point five) milligrams per kilogram (2 lb. 3½ oz.) or 54 milligrams per stone of body-weight. (3.86 times the weight in pounds equals the dose in milligrams.) The patient must be weighed naked and on an accurate scale and it is safer to have one's calculations checked by someone else.
- (b) Do not give the remedy to a child over 8 years of age or to one weighing more than 32 kilos (70 lb., i.e., 5 stone), for whom the dose would be 270 milligrams, the maximum permitted.
- (c) Examine the patient's urine before giving the drug and if there is any indication of renal disease, do not give it.

Many children experience some discomfort in the form of aches, pains and some malaise three or four days after taking the drug, but this disappears in a few days.

The hair begins to come out about 10-15 days after the drug has been taken and is easily and harmlessly pulled out in bunches. It continues to fall for about ten days and begins growing again four or five days later. The extracted hairs must be burnt and while the hair is coming out the child should wear a closely-fitting cap which is also burnt later.

Treatment may be summarized as follows:

- (a) Make the diagnosis.
- (b) Cut the hair short.
- (c) Epilate.
- (d) Gently rub into the scalp twice daily for 5-10 days some antiseptic ointment such as:

Whitfield's Ointment

R. Acid. Benzoic.	..	..	..	..	gr. 25
Acid. Salicylic.	..	..	..	..	gr. 15
Paraff. Moll. ad	3j

to which the writer likes to add:

Mercury Salicylate	gr. 10
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Others prefer sulphur ointment or Ung. Hydrarg. Ammoniata. Parke Davis's Mycozol ointment is also very good. The ointment mentioned above must be very gently rubbed in or its keratolytic property will make the scalp sore. If this occurs, omit the salicylic acid and halve the strength of the benzoic acid.

When the hair begins to grow again, examine it as before to make certain of cure, and destroy all possibly affected hats, caps or pagris.

Thallium acetate should never be given more than once to the same patient.

RINGWORM OF THE BODY.—This is easily cured in the hairless areas by the application of 10% Ichthyol (Ichthammol B.P.) ointment, Ung. Hydrarg. Ammoniata, Whitfield's ointment (see above) or Iodex. Painting with tincture of iodine, so often advised, is not recommended because of the soreness and pain it produces.

ATHLETE'S FOOT (Epidermophytosis).—After much experience of treating this increasingly common disease with all kinds of remedies, some of them specially imported from the U.K. and the U.S.A. for trial in a research he was conducting, the writer has found nothing to compare with the Glaxo fungicidal jelly Mersagel, or Parke Davis's Mycozol ointment. If either of these preparations is conscientiously rubbed into the affected areas twice a day and if the footwear and socks are conscientiously disinfected (*see below*), most cases clear up in two or three weeks, but strict attention to detail is necessary. If secondary infection is present it should first be cleared up by means of Cibazol or penicillin-flavine-sulphathiazole ointment, but these modern preparations do not seem to affect the epidermophyton.

If there is a great deal of macerated skin, desquamation can be helped by the following ointment:

R. Acid. Lactic.	}	.	..	.	..	aa 5ij
Acid. Salicylic.	}	.	..	.	..
Balsam. Peru.		..	..	..	..	gr. 20
Lanolin.	}	.	.	..	..	aa 3ss
Vaseline	}	.	.	..	..

This is very strong and should not be applied more than three or four times.

Other remedies are:

- (a) To soak the feet every two hours in Pot. Permang. 1:5,000 and to apply the lotion on gauze to the affected areas.
 (b) *Castellani's Paint*.

R Basic Fuchsin

Saturated solution in alcohol	.	10 c c.
Carbolic Acid, 1 in 20 in water	.	100 c c
Mix and filter, then dissolve in it		
Boric Acid (solubility 1 in 25)	..	4 grammes
After 2 hours, add		
Acetone	..	5 c c
and finally, two hours later add		
Resorcin	.	10 grammes

The solution should be kept in a dark stoppered bottle in a cool place (i.e., the "Frig." in a hot climate)

To be painted on twice a day.

- (c) Equally efficacious and less elaborate is:

1% Gentian Violet, in water, or gentian-violet jelly.

- (d) *Bigham's Ointment*.

R. Liq. Picis Carb.	..	..	..	..	3ij
Acid. Salicylic.	..	..	..	..	gr. 10
Zinc Oxid.	..	..	..	..	gr. 20
Paraff. Moll ad	..	..	..	..	3j

- (e) Equal parts of Acid. Carbolic. Liq. and camphor.
 (f) Sodium Caprylate Ointment 10% (Lilly).

The following powders are useful when the skin is sodden:

R. Zinc. Undecylate (Wallace & Tiernan)	..	20%
Undecylic Acid	.. .. .	2%
Talc Powder	.. .. .	78%
R. Sodium Propionate	.. .. .	20%
Talc Powder	.. .. .	80%

This is sold as Mycoban.

If formalin vapour or cresol washing of footwear is not available Bigham recommends the following powder for disinfecting shoes and socks:

R. Acid. Salicylic.	..	..	..	..	3j
Menthol.	..	..	..	..	gr. 30
Camphor.	..	..	..	..	5ij
Acid. Boric.	..	..	..	..	3jss
Starch	..	..	..	..	3j

X-rays judiciously applied to the affected area sometimes give very good results, but are apt to be followed by relapse; the worst case of this disease that the writer ever saw had had extensive X-ray treatment, but ultimately cleared up under the treatment first advocated above.

Finally, open footwear, such as the sandal or the chapli, is much better than boots or shoes.

The same fungus may affect the groins or the palm of the hand; in the latter case X-rays are most successful. The late Sir Peter Freyer of the Indian Medical Service is said to have been given a lakh of rupees by a grateful Rajah for curing him of this complaint. The Government objected, so he retired to No. 27, Harley Street with his lakh, and achieved great fame for his skill at prostatectomy.

Dhobie Itch (see under that heading).

RODENT ULCER (See also Ulcers.)

If diagnosed in the very early stage, this may be excised, or removed by CO₂ snow, which must be applied for two minutes.

By the time the lesion comes under observation it is usually unsafe to rely on these methods and the treatment of choice is contact X-ray given in an institution, e.g., the Tata Hospital at Bombay, where there are real experts who are constantly dealing with such cases.

Radium, similarly administered, is equally efficacious.

The application of sodium bicarbonate compresses has been found very effective, but in view of the dangerous nature of the disease it is better to rely on well-tried methods.

ROSACEA (See also Nose, Diseases of (Rhinophyma).)

This is commonest in women between the ages of 30 and 40 years, and consists of a redness, followed by vascular dilatation, small pimples and scaliness of the skin covering the nose, the chin, the cheeks and the middle of the forehead, a sort of fleur-de-lis distribution.

It is associated with indigestion caused by tea drinking, spiced foods and insufficient chewing; endocrine disorders—although it usually begins before the menopause—alcoholism, exposure to cold winds and a shortage of vitamin B₁ (riboflavin) are also factors.

TREATMENT.—This consists in correcting the errors just described, and in certain local applications:

- (a) Small weekly doses of X-rays.
- (b) Touching enlarged veins with the diathermy point.
- (c) Lotions such as the following:

R Calamin	1	..	..	aa 3ijss
Sulphur, Præcip	1	..	..
Glycerin				3j
Aq. Rosæ ad				3iv

or

R Zinc Sulph	}			aa 3ij
Potass Sulphurata				
Aq. Rosæ ad		..		3vi

A twice-weekly application of Ichthyol ointment (10%) may also be beneficial.

Of all the general measures correction of the bad habits leading to indigestion is probably the most important

ROUNDWORMS—See Worms.

SALINE

Physiological or normal saline solution is sodium chloride 9, distilled water to 1,000, or 0.9%. Hypertonic solution is 1½–3%; both must be made with doubly distilled water, as it has been shown that water first distilled, kept and then boiled, will give rise to fever if several ounces are injected into a vein, because it contains the dead bodies of bacteria. The ideal is water that has been doubly distilled within a few hours of use, the salt added after distillation, and the solution then boiled again, in practice, however, it is necessary to keep a quart flask ready made up hermetically sealed, to be warmed and used in case of emergency.

1. **INTRAVENOUS INJECTION.**—In shock and hæmorrhage it is second best, and should not be given if blood or plasma transfusion is available. The use of salines is a great advance in the treatment of head injuries; it combats the rise of intracranial pressure thus relieving the headache and irritability and lessening the stupor produced by cerebral oedema. It is used in some cases of puerperal sepsis, in eclampsia, and after bleeding. In the stage of collapse and anuria in blackwater fever early alkaline salines will often save the patient's life.

2. **SUBCUTANEOUS INJECTION.**—One or two pints are run into the loose connective tissue under the breasts in women, into the thighs, axillæ or groins in men, or into the flank in children. If given continuously, about half a pint should be given per hour.

Saline must never be given subcutaneously in cholera, as in spite of all aseptic precautions, the area injected is very liable to slough on account of the patient's greatly lowered vitality.

3 PER RECTUM.—Saline may be given in one large amount, e.g., one or two pints after an operation, as it relieves thirst, promotes elimination and lessens shock, or it may be given continuously by the drip method at the rate of about one pint per hour. Saline is also used for irrigation of the colon in dysentery and in the Plombières' system of lavage of the colon in the treatment of rheumatoid arthritis.

SALPINGITIS—See Gynaecology.

SAND-FLY FEVER

This disease is closely related to dengue and should be regarded as belonging to the same group. It is caused by a filtrable virus conveyed from man to man by sand-flies; the chief symptoms resemble those of dengue, but differ from it in that secondary rashes and rises of temperature are less common and a more lasting immunity is conferred.

TREATMENT.—There is no specific remedy, and it should be conducted on the same lines as for dengue.

SCABIES

During the 1939-45 war, overcrowding caused such a spread of the disease that much research was done and methods of treatment were greatly improved, but the old-fashioned sulphur treatment is still very popular among the poorer classes in India, and in severe cases is considered to be better than the newer methods. Three points deserve attention.

- (a) If there is a suppurative condition of the skin, this should be remedied before specific therapy is begun.
- (b) Although infection is mostly from body to body, some authorities going so far as to say that the disease can be caught only by sleeping in the same bed with an infected person, clothes and bedding should always be disinfected.
- (c) If one member of a household is infected, treat all the members whether they show signs of scabies or not.

TREATMENT.—

Preliminaries.—

- (a) Remove all clothes for disinfection.
- (b) Put the patient in a hot bath (105° F.) for 20 minutes, at the end of which he vigorously soaps himself all over, except the head and face, with a flannel, loofah or brush; he then washes off the soap and dries himself thoroughly with a towel, which is sent to be disinfected.

BENZYL BENZOATE METHOD.—With a firm brush vigorously

paint the body from the neck downwards with an emulsion containing equal parts of:

Benzyl Benzoate
Soft Soap
and Industrial Methylated Spirit

paying particular attention to the groins and axillae, the genitals, the buttocks, the forearms and the webs between the fingers and toes.

The Army formula for making benzyl benzoate emulsion is as follows; it is used in exactly the same way as the above and is less irritating.

- (1) Into 10 oz. of boiling water just taken off the stove, shred 132 grains of Lanette wax SX (a partly phosphated cetyl-stearyl alcohol much used in the manufacture of cosmetics and made by Ronsheim and Moore of London).
- (2) Dissolve the wax by gentle rotation. Ensure that the wax dissolves completely and that no aggregations remain.
- (3) Cool to about 104°F. and pour into a pint bottle.
- (4) Add 5 fluid oz. benzyl benzoate.
- (5) Shake the bottle vigorously.
- (6) Add 5 oz. water and shake again. An excellent emulsion will be produced and there is no need for prolonged shaking. Always shake the bottle before use.

Asebiol (M. & B.) is a similar preparation which gives excellent results.

Allow the emulsion to dry on the skin, then repeat the painting.

Give the patient some clothes to wear, see that he does not wash at all for 24 hours, and then repeat the bath and the double painting. If for some reason he has to wash, the washed area must be repainted with emulsion.

Twelve hours later the patient has a final bath, is given clean clothes and is considered cured. If the skin is sore or red, apply calamine lotion.

If large numbers of patients have to be treated the preliminary baths may be omitted.

When the treatment is correctly carried out, the cure rate is about 100%; failure results from carelessness or laziness.

SULPHUR OINTMENT METHOD.—After the preliminaries as above, anoint the whole of the patient's body with sulphur ointment 5% (i.e., half the strength of the *B.P.* preparation) every twelve hours until two, four or six inunctions, according to the extent and severity of the infection, have been given; the most severely affected parts may be bandaged, and the same precautions about not washing are observed as with the benzyl benzoate method. Twelve hours after the last inunction the patient is given a bath and clean clothes, and discharged. Calamine lotion soothes the skin if it is sore.

Tetmos emulsion (5%) is used in the same way as benzyl benzoate emulsion and is equally effective, and *Tetmos soap* is a good prophylactic.

SCALDS—See Burns and Scalds.

SCARLET FEVER

This is rare in India and Burma, but the writer has seen a few cases in both countries. Although it is due to a haemolytic streptococcal infection of the nasopharynx, sulphonamide therapy has not been so successful as one would expect, but penicillin is more useful.

DIAGNOSIS.—An attack of sore throat with high fever, rapid pulse and vomiting is probably scarlet fever.

The rash comes out on the second or occasionally on the third day; it is very fine and of an orange-red colour. It begins behind the ears and on the neck, and then spreads to the chest and the body, but not to the face, which is, however, flushed and with circumoral pallor.

The tongue is "white strawberry" to begin with but becomes "red strawberry" as the fur clears off, generally about the fourth day.

Septic complications such as otitis media are not uncommon, and nephritis, which usually recovers in a few weeks, may occur about the end of the third week.

The Incubation Period is 1-5 days and the duration of the disease about a week.

TREATMENT.—

- (a) Give sulphonamides by the mouth.
- (b) Give penicillin-sulphathiazole snuff (100,000 units to 30 grains) at three-hourly intervals.
- (c) If symptoms are severe, give penicillin injections 3-hourly.
- (d) If anti-scarlatinal serum, preferably concentrated, is available, give it early, 3,000 U.S. units being enough for an ordinary case.
- (e) If snuff is not being given give a gargle.
- (f) For the fever and discomfort give aspirin and Dover's Powder in usual doses.
- (g) Give an aperient.
- (h) Keep the patient in bed till the temperature and pulse have been normal for three days.
- (i) Isolate for six weeks, or longer if complications or nasal discharge are present.
- (j) Desquamating skin is not infective.

SCARS

Keloid scars are much more frequent in dark than in light-skinned races and after slight sepsis than after a clean cut. An unsightly or painful scar should when possible be excised under strictly aseptic conditions and the resultant wound carefully sewn up with the skin edges accurately approximated. Between the third and sixth week after operation, judicious doses of X-rays should be applied and the result will be a pliable and almost invisible scar.

If the keloid or unsightly scar cannot be excised X-rays may cause considerable improvement.

SCHISTOSOMIASIS—See Worms (Bilharzia).

SCHIZOPHRENIA—See Mental Diseases.

SCIATICA—See Nervous System.

SCLEROSIS, DISSEMINATED—See Nervous System.

SCOLIOSIS

This is a lateral curvature of the spine with rotation of the vertebrae. This condition may be classified as (a) Postural and (b) Structural. The former is generally seen in patients with round shoulders, general ill-health and muscular debility. Treatment should be directed to improving the general health and muscular tone with exercise, at the same time searching for any possible asymmetrical movement as the cause.

Structural scoliosis.—Once the deformity has become fixed by the loss of shape of the bodies of the vertebrae it is impossible to get rid of the lateral curvature. The following treatments may be tried: (1) Plaster jackets; (2) Corsets; (3) Supports. For details see a work on Orthopaedic surgery.

SCURF—See Dandruff or Scurf.

SCURVY

Bleeding from the gums and mucous membranes, weakness and anaemia are the chief symptoms. In infants there may be bleeding into the epiphyses of long bones.

TREATMENT.—As the disease is due to lack of vitamin C this remedy must be given, the dose being one gramme of ascorbic acid daily for a week, subsequently reduced to about 100 milligrams. Fresh fruit, fruit juices and vegetables are included in the diet. Other vitamins are probably required as well, and iron, as ferrous sulphate 3 grains t.d.s., is given for the anaemia.

For infants the dose may be proportionately reduced, although ascorbic acid is not toxic.

SEA SICKNESS—See Air Sickness.

SEBORRHOEA (For *Seborrhoea Capitis Sicca* and *Acne*, see under Dandruff or Scurf and *Acne* and Pimples.)

Although a variety of organisms have been described as responsible for seborrhoea, it is now realized that the soil is more important than the seed and that internal secretions, natural resistance and possibly vitamins, have a greater influence on the condition of the skin than the various organisms that are found in it.

Seborrhoea Oleosa is familiar to medical students, both male and female, because so many of them suffer from it in a greater

or lesser degree. In other words it is a disease of adolescence and is common to both sexes.

TREATMENT.—

Diet.—The late Leonard Williams used to say that the disease can be cured by cutting out meat and fat from the diet, and certainly the greasiness of the skin can be greatly lessened by doing so. The addition of vitamin B₂ (riboflavin) to the diet often has a beneficial effect; it is contained in milk, whey, liver and eggs, but the synthetic product, about 5 milligrams a day, should be given as well.

Hormones.—Menstrual irregularities in young women may be corrected by suitable hormone therapy (*see Gynaecology*) and either sex may benefit from oestrogens, e.g., dienocetrol 0.3 mg. daily.

Local Application.—Dimenformon (Organon) ointment applied to the affected area often produces marked improvement.

A lotion composed of equal parts of acetone, ether and spirit, or Innox 41 lotion is excellent for removing all grease from the skin, after which local remedies are applied.

An old favourite, to be applied at night is:

R Sulphur, Praecip.	..	..	..	gr. 15
Acid Benzoic.	}	..	..	..
Acid. Salicylic.		..	..	aa gr. 10
Benzoated Lard	}	..	..	..
Coconut Oil		..	..	aa 3ss

• This is also suitable for the scalp.

Where there are actual pimples the nightly inunction of 10% sulphathiazole ointment after the skin has been "de-greased" with Innox 41 is most successful.

Young women generally conceal the greasy condition of their skin by an ample application of powder or make-up.

X-rays are always worth trying if there is a tendency to pimple formation, and sometimes succeed when other treatment has failed.

SEPTIC THROAT

Chemotherapy (q.v.) is given in almost all cases nowadays, and of the local applications the writer has found the following powder the best:

R Penicillin	..	..	..	100,000 units
Sulphathiazole	..	..	..	30 grains
To be snuffed right up the nose, so that some of it				
lies on the posterior nasopharyngeal wall.				

It should be snuffed up at least once every three hours, and after every meal, because the saliva tends to wash it away. Chemotherapy should be maintained for at least five days or there may be a relapse.

Failing this, the following gargle is useful and soothing:

R Acid Carbolic, Liq.	}	..	..	..	aa ʒj
Liquor Potassae		..	..	..
Tinct. Lavand Co.		..	..	..
Glycerin	..	..	..	..	ʒj
Aq ad	..	..	..	..	ʒvi

To be used frequently, with an equal amount of hot water.

A purgative should be given at the beginning of treatment, a swab taken and examined whenever possible, and the patient isolated in bed.

It is particularly important that all eating and drinking utensils be kept separate from those of other people, and well boiled before being given to anyone else. Discomfort in the throat can be relieved by aspirin.

SEPTICAEMIA AND PYAEMIA—See Chemotherapy.

The source, when possible, should be treated, and abscesses aspirated or opened and drained.

SEPTICAEMIA, PUERPERAL—See Obstetrics and Chemotherapy.

SERUM SICKNESS—See Specific Therapy.

SERUM THERAPY—See Specific Therapy.

SEXUAL IMPOTENCE—See Impotence, Sexual.

SHOCK (See also Blood Transfusion.)

Primary shock is akin to fainting and comes on during or very soon after the causative occurrence, which may vary from the perforation of a gastric ulcer to the witnessing of an unpleasant sight. The patient collapses and may become unconscious, the skin is cold, pale and clammy, the pulse is imperceptible and the blood-pressure very low. Recovery is rapid and the treatment is to lower the patient's head and to fortify him, or more generally her, with smelling salts, half an ounce of neat brandy, or a teaspoonful of Spirit. Ammon. Aromat. in an ounce of water. As remarked above, the cause may be serious or trivial, so it must be ascertained.

Secondary shock is a much more serious affair, because it is often a prelude to death; treatment must, therefore, be immediate and efficient. The condition occurs after serious injury or haemorrhage.

A child of six was run over by a railway train and his right arm severed at the shoulder joint. He picked it up and took it home to his mother, who took him to hospital. Although the train had crushed the vessels and there was no bleeding, the house surgeon gave him an anaesthetic and began to "tidy things up." The child died on the table.

The condition takes some time to develop, usually between half an hour and several hours. A point that deceives the novice is that in secondary shock the patient is quietly conscious and remains so until just before the end. (Long before the treatment of secondary shock was properly understood, the writer saw such a patient drink and enjoy a whisky and soda ten minutes before he died.)

The signs are pallor, coldness of the extremities, cyanosis of the lips and nails, and a low blood-pressure; this is the most important

sign of all and the prognosis can be roughly graded by the systolic pressure, as follows:

Between 100 and 90 Good

" 90 " 80 Fair

" 80 " 70 Poor

" Below 70 Desperate

} Immediate treatment
needed to save life.

The pulse is small in volume and soft; it is generally rapid, but it may be slow.

CAUSE.—The cause of secondary shock is a diminution in the volume of the circulating blood. Normally the blood forms about one-eleventh of the body-weight, the average volume being about 10 pints, of which 60% is plasma. The degree of shock depends partly upon the speed with which the blood volume is diminished; thus, a rapid loss of about three pints due to haemorrhage or to extravasation of serum into large areas of burnt or crushed tissues will cause profound shock, but losing the same amount of blood in 24 or 48 hours will merely cause some anaemia. The converse is also true; the first part of a transfusion must be rapid.

TREATMENT.—Treatment is to restore *and maintain* the blood volume. The patient is, of course, kept in bed—the foot of which is raised 12 inches—and kept warm; he is given sweet, warm tea to drink, with a little salt and brandy added, and if in pain is given an injection of morphia, but transfusion is the essential part of treatment and is carried out on an operating table if other treatment is necessary too.

Plasma is obtainable in two forms: (1) liquid, in a sterile container such as a Lyovac, or (2) dried; in this case it must be reconstituted with sterile pyrogen-free isotonic glucose-saline (generally provided with the flask of dried plasma). Every hospital keeps—or should keep—a supply of plasma and a complete set of sterilized tubing, needles, cannulae, dissecting instruments, local anaesthetic and syringe ready for use at a moment's notice. The details of administration are described under Blood Transfusion, but the following points deserve attention:

- (a) Begin plasma transfusion as soon as possible after making the diagnosis of shock.
- (b) Do not waste time in warming the plasma.
- (c) Inject the first pint (or half litre) quickly, that is to say, in 10 minutes, the second in 20 minutes and the third in 30 minutes.
- (d) While the patient is being transfused his blood may be typed and matched against that of a donor or a "blood bank" which in most places is obsolete in peace time. If suitable blood is obtainable one pint is usually given for every two pints of plasma.
- (e) Three pints or 1,500 c.c. is the usual quantity required.
- (f) Each pint raises the blood-pressure by about 20 mm. Hg.

so this must be taken at frequent intervals. If the blood-pressure does not rise after two pints have been given, stop the transfusion; the patient has "irreversible shock" and will die.

- (g) The systolic blood-pressure must be over 100 before transfusion is stopped (except in irreversible shock).
- (h) Any sign of relapse or of fall in blood-pressure calls for another transfusion, which may have to be repeated on several days.
- (i) If internal haemorrhage is going on, give the transfusion rapidly and operate while it is being given. The important thing is to tie the bleeding point; once this is done, the patient picks up rapidly.
- (j) Do not transfuse an unconscious patient unless you are sure that no bleeding is going on inside his head.
- (k) Pneumonia is extremely frequent in shocked patients after transfusion, so do not over-transfuse or you may cause oedema of the lungs.
- (l) A dose of Coramine and 200,000 units of penicillin may be added to the plasma.

If plasma is not available, give intravenous glucose-saline and arrange, if it is humanly possible, for a blood transfusion; if this cannot be done, the only hope is to give the patient 3 pints of glucose-saline in the first hour and to continue a drip saline thereafter, because most of a saline infusion has left the circulation in about 20 minutes. It seems probable that in the near future some substitute for plasma, such as hydrolysed protein, may be produced. Gum-arabic saline is generally considered no better than ordinary saline.

A rectal-drip saline is a valuable adjuvant.

SINUSITIS, ACCESSORY—See Nose, Diseases of.

SKULL, FRACTURES OF—See Head Injuries.

SLEEPLESSNESS—See Insomnia.

SMALLPOX

This disease shares with measles the distinction of being more infectious than any other disease. This is partly because it is carried by contact and droplet infection, but largely because the typical rash does not appear till the third or fourth day, so the case remains undiagnosed, and consequently unisolated during the highly infective stage of invasion.

DIAGNOSIS.—In an endemic area, any unprotected person suffering from frontal headache, pains in the back and fairly high fever, should be suspected of having smallpox until proved otherwise. (Influenza, sand-fly fever, dengue and malaria can all produce similar symptoms.)

Occasionally a prodromal erythematous rash on the "bathing-drawers" area appears on the second day, but not with sufficient constancy to make its absence of any diagnostic value.

The Rash appears on the third or fourth day and within a few hours of its appearance is distinctly palpable on the forehead, which has a shotty feeling. (Time and again the writer has found this sign to be of great value.)

In a severe or confluent case the rash is all over the body, but even so, it is most marked in those parts of the skin exposed to weather, wear and tear, and in a slight case, which is always the most difficult to diagnose, these may be the only parts to show the typical, shotty spots. Thus, a baby may have a profuse rash on the napkin area, or a coohe on the shoulders.

Although the rash is described as coming out in one crop, it usually begins on the forehead and face, and may take two or three days to reach the hands and feet. (*N.B.*—If the palms and soles are affected, the case is probably smallpox.) The pocks are more uniform in size, shape and stage of development than are those of chicken-pox, which come out in successive crops, and the palate is affected to a greater extent than in chicken-pox.

Progress of the rash is somewhat as follows:

<i>Day of Disease</i>	<i>Type</i>
3	Macules, soon becoming shotty papules
5	Vesicles, umbilicated
7-8	Pustules
9-11	Rupture and desiccation
11-28	Separation of scabs

The patient is considered to be infectious until the last scab has separated, and the scabs harbour the living virus.

The temperature is high for the first three days and falls when the rash appears, but rises as the rash becomes vesicular and pustular; it finally falls about the 10th day, when the vesicles rupture and dry up.

TREATMENT.—Treatment consists in care of the patient, care of the skin, care of the eyes and care of other people.

CARE OF THE PATIENT.—General nursing, cleanliness, bedpans, sick-room diet, attention to the bowels, and stimulants or analgesics when required are as for any other case of serious illness.

Special Treatment.—The writer has had some success with xylol, given in milk, 30 minims 4-hourly, then 6-hourly and finally 12-hourly for consecutive periods of 3 days. The rash seems to be less violent and the patient less toxic.

Chemotherapy has no effect on the toxic virus component, but may have a very marked effect on the septic component of the rash. It also prevents that distressing sequel, pyaemia, so often seen in weakly children in India.

CARE OF THE SKIN.—Of all the lotions, potassium permanganate,

1: 5,000, dabbed on the skin once every four hours, is about the best. The skin of the face should be dusted with a powder composed of sulphathiazole 10% in boric acid powder, to which penicillin may be added. The patient should be nursed in a darkened room with red curtains on the windows and a red shade on the lamp.

CARE OF THE EYES.—In a confluent case it may be impossible to open the eyes, but the skin of the lids should be dusted with the powder just mentioned, and eye drops, by far the best being penicillin 2,500 units per c.c. (i.e., 40 c.c. of re-distilled water to one bottle of 100,000 units penicillin) dropped in the eyes every two hours. If this is not available, use Albucid 15%, Collosol Argentum, Argyrol or Protargol 5–10% every four hours. To prevent retention of secretion the lids should be Vaseline'd and the eyes gently irrigated with boric lotion or normal saline twice a day.

These measures would prevent a great deal of the blindness one sees after smallpox. It should be remembered that pocks can appear on the conjunctiva and on the cornea, and if sepsis is allowed to supervene the result is likely to be ulceration, perforation and blindness.

CARE OF OTHER PEOPLE.—This means taking the usual precautions; all contacts should be vaccinated and the patient strictly isolated, preferably in hospital.

VACCINATION.—Every child should be vaccinated within four weeks of birth, or within the first few days if there is any smallpox about.

Linear vaccination and other fancy methods should be avoided, as it has been shown that the protection they afford is much less than that given by the usual method.

Girls are usually vaccinated on the outer side of the calf, or thigh below the napkin area, and boys on the outer side of the upper arm.

The Government of India lymph is of the very highest quality, potency and uniformity, and should always be used when possible. Kept on ice or in the Frigidaire it retains its potency for about two weeks, but is preferably used within seven days of receipt.

Passage regulations insist on vaccination every two years, but it is generally considered that a successful vaccination affords complete immunity for five years.

The writer's method, with Government of India lymph, is as follows:

- (a) Put the patient in a good light and expose the area to be vaccinated; do *not* wash the skin with spirit or other anti-septic, but with soap and water if dirty, and then dry it.
- (b) Thoroughly shake the small tube in which the calf lymph is supplied.
- (c) Remove the cork and with the wet surface that was inside the tube apply some calf lymph to two areas about an inch apart.
- (d) Stretch the skin between the left finger and thumb, and with

a sterile needle (there must be no antiseptic on it) quickly scratch the lymph-covered areas about a dozen times in two directions at right angles. The scratches should just draw blood in one or two spots.

- (e) Leave the area exposed to the air (but in no circumstances to sunlight because it kills the virus) for about ten minutes, by which time it is dry. No dressing is required.

COURSE.—

(1) In a previously unvaccinated person, the normal progress of vaccination is as follows:

<i>Day</i>	<i>Type</i>
3-4	Papule with red areola (dressing required, and area must be kept dry)
5-6	Vesicle, inflammation increases
8	Umbilication of vesicle
9-10	Pustule
11-12	Begins to dry up
16-21	Scab comes off

(2) In a previously vaccinated person with partial immunity the progress may be quicker:

<i>Day</i>	<i>Type</i>
2	Papule with areola
3-4	Vesicle
4-5	Pustule (sometimes does not reach this stage)
5-7	Scab

(3) The Army lays down that "Readings will be made seven days after vaccination, and in those in which vesicle formation is present the result will be recorded as 'Successful.' When there is no vesicle formation, re-vaccination will be carried out immediately. If vesicle formation is present on the seventh day the result will be recorded as 'Successful.' All other cases will be recorded as 'Insusceptible to Vaccination'."

(4) If a patient is vaccinated three times within three weeks without result, immunity may be assumed provided that the vaccine is known to be potent, as shown by its effect on others. Such a patient should always be re-vaccinated within a year or in the presence of an epidemic.

(5) Successful vaccination within *four days* of exposure to infection generally protects, and within *seven days* modifies the attack, so all contacts should be vaccinated as soon as possible.

POST-VACCINAL ENCEPHALITIS—This occurs only in older children and adults vaccinated for the first time; even so, it occurs in only about 1 in 3,000 cases. The symptoms are not constant, cases resembling meningitis, tetanus, poliomyelitis or encephalitis, and benign lymphocytic meningitis.

Treatment is by the serum of patients vaccinated from the same batch; the incubation period is about 12 days and the mortality between 40 and 50%.

Patients who recover do not have any sequelae.

Apparently it can be prevented by diluting the vaccine 1:20 with saline and making only one insertion, but this is quite unnecessary in infants and in re-vaccinations, and should not be done when there is any question of contact with smallpox. The best means of prevention is vaccination in infancy, when the complication does not occur.

VACCINATION ERUPTIONS

(MORRIS)

GROUP I.—*Eruptions due to Pure Vaccine Inoculation.*

GROUP II.—*Eruptions due to Mixed Infection (Vaccine with an Additional Virus).*

GROUP I

ERUPTIONS DUE TO PURE VACCINE INOCULATION

DIVISION A.—*Secondary local inoculation of vaccine.*

DIVISION B.—*Eruptions following within first three days, before development of vesicles: (a) Urticaria; (b) Erythema Multiforme; (c) Vesicular Eruptions.*

DIVISION C.—*Eruptions following after development of vesicles, due to the absorption of virus.*

1. Roseola—like Measles; Erythema—like Scarlet Fever; Lichen; Purpura.
2. Generalized Vaccinia.

DIVISION D.—*Eruptions appearing as sequelae of vaccination: (a) Eczema; (b) Psoriasis; (c) Urticaria.*

GROUP II

ERUPTIONS DUE TO MIXED INOCULATION

DIVISION A.—*Intrduced at time of Vaccination.*

- (a) Producing local skin disease: (1) Contagious Impetigo; (2) Erythema.
- (b) Producing constitutional diseases: (1) Syphilis; (2) Leprosy; (3) Tuberculosis.

DIVISION B.—*Introduced, not at the time of vaccination, but subsequently through the wound:*

- (1) Erysipelas; (2) Cellulitis; (3) Furunculosis; (4) Gangrene; (5) Pyaemia.

SNAKE-BITE

The two main groups of snakes found in India are the Colubrines, which include cobras and kraits, and the Vipers.

SYMPTOMS OF COBRA AND KRAIT BITES.—

Colubrines affect the Central nervous system.

(a) As the cobra has to raise its head in order to bite, the wound is likely to be on the fleshy part of the leg. Once it has bitten, the cobra sometimes holds on.

(b) *Locally* there is early and severe oedema with severe pain; this is soon followed by numbness, which spreads up the limb, and within an hour,

(c) *General Symptoms* supervene: the patient staggers, the limbs become paralysed, the speech is thick, the saliva dribbles from the mouth, the eyes are half-closed and the patient semi-conscious; soon the breathing becomes shallow and the pulse feeble, and after a varying time respiratory paralysis sets in, to be followed by cardiac failure and death.

If, however, the bite is not fatal the symptoms become arrested at one of the earlier stages and recovery is rapid.

SYMPTOMS OF VIPER BITES.—

Viper venom attacks the Vascular system.

(a) As the viper can strike from ground level the bite is often on the foot or toe. Once it has bitten, the viper lets go immediately.

(b) *Locally*. Severe pain and oedema with *continued oozing of haemolysed blood from the bite*, and a surrounding ecchymosis; within an hour,

(c) *General Symptoms* occur in the form of widespread haemorrhages under the skin and from mucous membranes; petechiae, especially near the bite, epistaxis, haemoptysis, haematemesis, melaena, haematuria and subconjunctival haemorrhages may all occur. Death takes place within a few hours from heart failure or within a few days from haemorrhage.

TREATMENT.—First it is necessary to decide whether the bite is poisonous or not.

If any of the above symptoms, local or general, are present, the bite is poisonous, and no time must be lost.

"If nothing happens within ten minutes following a bite the snake was harmless." (Sokhey).

If a patient with a tight ligature shows no general symptoms four hours after being bitten, he will not die.

Examine the bite carefully, with a lens if possible; if there are two punctured wounds close to each other one must assume that the bite is poisonous. If there are more than two serrated wounds the snake is probably a grass snake and the bite is not poisonous.

Doubtful cases should be treated as poisoned.

IMMEDIATE TREATMENT.—

(1) *Amputation.*—If a digit is bitten by a poisonous snake and amputated within two minutes, most of the poison will be removed; this is sometimes done by the patient or by someone with him, seldom by a doctor. Even within ten minutes, amputation removes a

good deal of the poison, but amputation of a whole limb is rarely justified.

(2) *Tourniquet*.—When, as is usual, amputation is not carried out, apply a tourniquet tightly enough to stop all circulation, in other words above the knee or elbow or round a bitten toe or finger. Any material may be used, such as a handkerchief, pagri, bandage or rubber tube, the non-elastic tourniquet being twisted tightly with a stick, rod, pen or pencil.

(3) *Washing*.—Then wash the skin round the bite as thoroughly as circumstances permit and with whatever fluid is available.

(4) *Second Tourniquet and Incision*.—Next apply a "venous" tourniquet, tight enough to obstruct a vein but not an artery, distal to the arterial tourniquet but above the bite. Make a linear incision about an inch long, and $\frac{1}{4}$ -inch deep in the long axis of the limb, with the bite at its centre, or as nearly so as possible. More than one bite needs more than one incision.

(5) *Bleeding*.—Release the arterial tourniquet, keeping the venous one in place, and let blood flow freely from the incision. If the vein draining the poisoned area now becomes visible, incise it too, and by massaging from above, try to increase the amount of venom escaping in the blood. After one or two ounces of blood have escaped tighten the arterial tourniquet again.

The writer is indebted to Colonel S. S. Sokley, Director of the Haffkine Institute, Bombay, for permission to include the following extracts from the Institute official pamphlet.

"(6) *Suction*.—Drainage of blood and lymph from the cuts should be induced by suction. Suction should be done mechanically by means of a cupping device, which consists of a glass or metal cup with a rubber suction bulb attached to it. There should be at least two different sizes of cups in a snake-bite kit—one of glass with a round opening of about one inch in diameter for flat surfaces, and another of metal with a narrow, oval opening to fit against the surface of a finger or other rounded part. Mechanical suction should continue for several hours after ligation has ceased. During the intervals in the suction treatment, the incisions should be covered with wet pieces of cloth saturated with solution of table salt or Epsom salts in water, in order to promote drainage of lymph by osmosis.

If no cupping device is at hand, drainage should be induced by sucking the wound, there being practically no danger from this if lips and mouth are free from cuts and sores.

Caution.—It is well to wash the incisions with a weak solution of potassium permanganate crystals in pure water (to produce a pale amethyst hue), as this solution will neutralize by oxidation what venom it may reach. But it is very dangerous to apply crystals or strong solutions of potassium permanganate to the wounds. Cauterizing the wounds is still worse for it actually seals the deadly poison within the tissue."

"(7) *Lyophilised Serum*.—(Taken from the pamphlet mentioned above.)

DIRECTIONS FOR USING LYOPHILISED POLYVALENT ANTI-SNAKE- VENOM SERUM

This anti-snake-venom serum is prepared by hyper-immunizing horses against the venoms of the four common poisonous snakes of India, namely, (1) Cohra (*Naja naja*), (2) Common Krait (*Bungarus caeruleus*), (3) Russell's Viper (*Vipera russelli*) and (4) Saw-scaled Viper (*Echis carinatus*). Plasma, obtained from the hyper-immunized horses, is concentrated and purified. Each c.c. of the concentrated serum neutralizes not less than the following quantities of dried venoms, when the serum is injected along with the venoms intravenously into white mice: Cobra, 0.6 mg.; Common Krait, 0.45 mg.; Russell's Viper, 0.6 mg.; Saw-scaled Viper, 0.45 mg.

The serum is lyophilised by drying it from the frozen state under high vacuum. The drying process is continued until the moisture content is reduced to less than 1%. The dried serum, however, retains its affinity for water to the fullest extent, and, therefore, dissolves rapidly on addition of water. This property is maintained by the dried serum even after storage for many years.

Once the venom has got into the circulation, it is only the anti-snake-venom serum that can neutralize it, and in order to derive the greatest benefit from serum treatment, the serum should be injected as soon after the bite as possible. As a first dose, at least 20 c.c. of the reconstituted serum (see below) should be injected *intravenously*. The second dose should be repeated two hours after the first dose or even earlier, if symptoms persist. If the symptoms, which vary with different venoms, indicate persistence of venom action, further doses should be repeated every six hours until the symptoms completely disappear. In case of a viper bite some serum should also be injected round the site of the bite to prevent gangrene which otherwise results owing to the very destructive effect of localized viper venom on tissue.

The venoms of cohra and common krait act very rapidly if a large amount of venom is absorbed into the circulation. Hence, it must be understood, that unless the absorption of the venom into the circulation is retarded by ligation, incision and suction, the anti-snake-venom serum does not get a fair chance to neutralize the venom and save the victim. First-aid treatment should, therefore, never be relaxed even when the serum is administered.

Intravenous injection of serum in horse-serum-sensitive subjects can produce very severe serum sickness and even acute anaphylaxis. Every care should be taken to prevent these reactions.

Intramuscular or subcutaneous injections of the anti-snake-venom serum are not as effective as intravenous injections, but if expert medical aid is not available, the serum may be administered by the subcutaneous or the intramuscular route. *The dosage should then be increased from 2-3 times that recommended for administration by the intravenous route.*

RECONSTITUTION OF LYOPHILISED SERUM

1. Draw 10 c.c. of the distilled water in a sterile syringe.

2. Cut a line with the file about halfway round the neck of the ampoule of lyophilised serum, and gently break open the neck.

3. Transfer the water from the syringe to the serum ampoule.

4. Cover the opening of the ampoule with the sterilized pad of handyplast, gauze surface downwards, press it down with the thumb, and holding the ampoule in the hand shake it vigorously for about one minute. For the purpose a piece of sterilized handyplast is provided; for use remove it from its cellophane cover.

5. Now let the ampoule stand for one minute for the serum to clear. The reconstituted serum will become crystal-clear and ready for injection. Froth and undissolved particles, if any, should be left in the ampoule; excess serum has been added to allow for this.

6. If the pad of handyplast falls on the floor after it has been removed from the cellophane cover it should not be used. Instead, the opening of the ampoule may be closed for shaking with the tip of the thumb painted with tincture of iodine or any other antiseptic carried in your first-aid snake-bite kit.

7. For the second and subsequent injections, you will have more time to dissolve the lyophilised serum. For these add 10 c.c. distilled water to the serum ampoule and rotate it between the palms of your hands until the serum is fully dissolved, and let the ampoule stand for serum to clear.

STORAGE

Liquid serum is very unstable at room temperature. It requires storage at 0° C. to 4° C. Even then it deteriorates, and in 2 years from the date of manufacture, the serum becomes unfit for use. In India, proper cold storage facilities are not freely available and therefore liquid serum can only be stored at the risk of very rapid deterioration. *Lyophilised serum obviates this difficulty.* It is many times more stable than liquid serum. It should retain its potency for 10 years even, if stored in any cool dark place. Thus anti-snake-venom serum can be made available for use far away from cold storage facilities. It can be safely kept at rural dispensaries and even carried in a haversack on one's back if an occasion demands it. However, it is preferable to store it in a refrigerator if one is available.

ASSOCIATED TREATMENT

In cases of Russell's and saw-scaled viper poisonings sedatives, such as morphine, small doses of a barbiturate, or aspirin, may be given to relieve pain and nervousness. They should, however, be used with care in cobra and krait poisonings. For collapse, strychnine, Pituitrin, or other general stimulants are of special value. In all severely poisoned persons, great relief is likely to be experienced from the infusion of a large amount of physiological saline, or still better, transfusion of blood or plasma, the effects of which may be life-saving in borderline cases."

CHEMICAL NEUTRALISATION.—If there is no antivenene, the tissues proximal to the bite may be infiltrated with about 10 c.c. of 1:5,000 pot. permang. or 1:10 Milton or eusol; the practice of injecting 2 c.c. of gold chloride solution is seldom carried out

because of the damage it inflicts on the tissues. If there is no syringe, open up the bitten area widely and apply mag. sulph. crystals.

GENERAL TREATMENT.—Support the patient's strength with hot coffee or tea, and injections of Coramine or other stimulant. The practice of giving plenty of alcohol has its advocates and its opponents. If a patient is suffering from severe fright, it does him no harm to get drunk.

When the bite is on the face or body make a crucial incision with the bite in the centre and apply dry cupping. This is done by burning some paper, cotton-wool or spirit in a bottle, glass or cup and applying the vessel to the part; the flame immediately goes out and the partial vacuum that is left sucks the wound.

PREVENTION.—As more than half the number of snake bites occur below the knee and are usually caused by inadvertently treading on a snake, the wearing of boots and the carrying of a lantern are two of the most obvious precautions. Very few snakes attack human beings spontaneously, but just as a dog will bark or snap when trodden on, the snake retaliates by biting.

When treated with formalin, snake venom forms anaveneae, in the same way as diphtheria and tetanus toxins form immunizing anatoxins; there may, therefore, be some hope that people can be immunized against snake-bite.

Snakes are timid animals on the whole, and as already remarked, seldom make an unprovoked attack. They avoid large cities, preferring villages, jungles and open country and are commoner in the damp than in the dry parts of India. Of the deadly snakes the colubrids, cobra and krait, are most common in or near houses, the latter being nocturnal in its habits.

If a dead snake is brought for decision whether it is poisonous or not "run a pin along the margin of the upper jaw and if only one tooth is struck, which is prominent, the snake is poisonous."—(*Field Service Hygiene Notes*). Next examine the fangs, which are grooved in the cobra and have a central canal in the viper.

For further identification compare the head with Colonel Wall's famous diagrams.

SPECIFIC THERAPY

By JOHN W. H. EYRE, M.D.

In diseases of bacterial origin, the disease process is the expression of an interaction between the infecting agent and the body tissues. The contribution of the micro-organism to this interaction is the production of the specific chemical poisons (*toxins*) incidental to the life of the bacterium.

Toxins are of two kinds: those existing in the bodies of the bacteria and set free only by their disintegration or solution—*endotoxins*—and those secreted into the medium in which the bacteria thrive—*exotoxins*. The invasion of the body by living bacteria leads to the production of a series of protective substances (*antibodies*) of highly complex nature which act beneficially.

This beneficial action is exerted either by neutralization of the exotoxins (*antitoxins*), by direct destruction of the bacteria (*bacteriolysins*), or by stimulation of the leucocytes to phagocytosis (*opsonins*). Specific therapy has, as its object, the artificial increase of these antibodies. To supply ready-made antibodies is to confer *passive immunity*; to stimulate the manufacture of antibodies by the patient is to confer *active immunity*. Passive immunity is conferred by the employment of immunized serum derived from other animals. Active immunity is conferred by the employment of bacterial vaccines or, in some cases, the toxins (*toxoids*) of bacteria in safe doses.

Sera are produced by the inoculation of suitable animals with (a) toxin or (b) killed or living bacteria in increasing numbers, or increasing virulence, until the blood-serum of the animals possesses high (a) antitoxic or (b) bactericidal value.

A bacterial vaccine is a suspension in isotonic (normal) saline solution of micro-organisms obtained in bulk and free from exotoxin. Thus, a suspension in normal saline of the bodies of the micro-organisms so obtained, is virtually a preparation of the endotoxins of the micro-organism.

The toxins or modified toxins (*toxoids*) of bacteria are also used to obtain active immunization, e.g., in scarlet fever and diphtheria.

Immune sera act rapidly, but their action is transient; vaccines and toxoids act slowly, but their action is more prolonged. Immune sera supply important substances that are lacking in the body, and they probably do not require much active response on the part of the tissues in order to produce their effects; vaccines and toxoids depend for their action upon a latent power in the tissues of producing antibodies, when specifically stimulated to do so.

VACCINE THERAPY

Vaccine therapy is often spoken of disparagingly, but if efficiently carried out with due regard to all the factors involved, the results are at least 75% satisfactory, but it is not a simple and easy matter, and frequently demands much thought and patience on the part of the physician; due appreciation must be given to the underlying difficulties and causes of failure.

The following are the chief causes of failure:

1. NEGLECT TO CONSIDER THE PATIENT'S GENERAL CONDITION.

(a) The patient may be unable to react on account of the temporary exhaustion of the normal antibody, and this would be shown in an examination of the blood by a leucopenia, or the blood may show a leucocytosis revealing a septic focus requiring surgical treatment; a lymphocytosis would suggest a condition of leukaemia or possibly pernicious anaemia.

A reduction in the number of the red corpuscles with a still greater reduction of the Hb, so that the colour index is about 0.7 would indicate a secondary anaemia, requiring treatment by iron, arsenic and possibly liver before the commencement of vaccine therapy.

(b) Biochemical examination may reveal endocrine or metabolic defects. Thus a low blood-sugar would show a hypofunction of the pituitary, thyroid or suprarenal. A glucose tolerance test might show a defective hepatic or pancreatic metabolism. Increased uric acid and non-protein nitrogen might reveal a parenchymatous nephritis. These conditions would require appropriate treatment before vaccine treatment could hope to succeed.

(c) Allergic conditions, as shown by a marked eosinophilia, and other signs of this condition would interfere with treatment.

(d) Persistence of infective foci is another cause of failure, and this may amount to a dangerous condition if the focus is closed as in the case of the mastoid, accessory sinuses or an empyema. Unless there is a free exit for discharges, the focal reaction in a closed focus may give rise to a general infection. A focus such as this must be dealt with surgically to avoid repeated re-infection.

Care must be taken to provide the right antigen, by obtaining in the first place a satisfactory specimen from which the organism pathogenic to the patient is isolated. All possible sources of infection should be examined, and the method of selective culture of Solis Cohen used as being the only practical method available for obtaining evidence of the pathogenesis.

2 **DOSAGE.**—This is important as the idiosyncrasy to vaccine dosage may be as marked as the idiosyncrasy to drugs such as antipyrin, aspirin and iodoform. Apart from prophylactic treatment, such as typhoid inoculations, it is impossible to fix a standard dosage, as the infection may be general or local, quite apart from the varying susceptibility of the patient.

Consideration must be given to the hypersensitive and insensitive types of cases. The former are usually of long standing due to a latent focus, and may be so intolerant of small doses as to make vaccine treatment inadvisable. The possible methods of dealing with these cases are, removal of the active focus, desensitization by a detoxicated vaccine, the use of a sensitized autogenous vaccine or, the patient having become sensitive to his own organism, replacing the autogenous by a stock vaccine.

The majority of cases of the insensitive type are found in cases of furunculosis and less often in chronic rheumatic and catarrhal conditions. The usual doses are quite inadequate in these cases, and in some cases of furunculosis three or four times the maximal dose must be used, but in the type of case showing marked debility, the blood-forming centres will require stimulation, or a donor to give an autogenous immune serum, or a whole-blood immune transfusion, to be followed by small doses of sensitized vaccine.

3. **TYPE OF VACCINE.**—This is another important consideration; whereas a stock vaccine can be used for subacute or chronic conditions, an autogenous vaccine is usually essential for the treatment of acute conditions, or one of the special varieties of vaccine to be subsequently mentioned may be necessary.

4. **DURATION OF THE TREATMENT.**—Many failures are due to

insufficient duration. Whereas a recent acute case may be cured with a few inoculations, a chronic infection may require regular treatment for at least a year, perhaps at intervals for two or three years, especially in some cases of haemolytic streptococcal infections, but in all chronic conditions it must be remembered that it is even more important to treat the associated and resulting changes of metabolism than the actual infection.

KINDS OF VACCINE

1. **ORDINARY VACCINES.**—These are simply suspensions of killed bacteria, and the dose is expressed as the number of bacteria injected, in so many millions. They give the best and most lasting immunization, but demand response on the part of the patient's tissues. These vaccines may be stock, i.e., prepared from any suitable case, and kept in readiness; or autogenous, when the culture is taken from the actual patient on whom the vaccine is to be used.

The only vaccine containing living organisms is Vaccine Lymph. (*Vaccinum Vaccinæ B.P.*).

2. **SENSITIZED VACCINES.**—These are vaccines in which an emulsion of the organisms is left in contact for several hours with the serum of an animal immunized against the same organism. The specific antibody in the serum becomes attached to the micro-organisms, and when injected is ready for immediate phagocytosis. These vaccines are therefore of special use in acute infections, when rapid immunization is of first importance. They should be given early in the case in large doses and can be repeated at 24-hour intervals.

3. **DETOXICATED VACCINES.**—These are ordinary vaccines treated by chemical reagents so that the endotoxin has been removed from the micro-organisms. They do not require specific anti-bacterial sera in their preparation. They are used in the same type of cases in which sensitized vaccines are used, and at the commencement of treatment. Their dosage interval is intermediate between sensitized and ordinary vaccines.

4. **DEFATTED VACCINES.**—It has been thought that the therapeutic failure of some vaccines may be due to the protection of their protein by lipoidal substances, and defatted vaccines have had these substances removed by acetone and formalin.

5. **REINFORCED VACCINES.**—This is a vaccine containing a 5% solution of sodium nucleinate, with the object of stimulating the tissues of a patient with lowered vitality, and is considered of value in these cases; it can also be used with ordinary sensitized or detoxicated vaccines.

6. **ORAL VACCINES.**—The oral administration of vaccines so much advocated in France is generally considered by English authorities to be useless.

PREPARATION OF VACCINES

The first step in the preparation of a vaccine is to isolate in pure culture the causative micro-organism of the disease to be treated. This is essential to success and is the foundation upon which all

vaccine therapy is based. The method of achieving this object is to inoculate tubes or dishes of culture media with a portion of the exudate, secretion or tissue concerned, as free as possible from contamination, and to incubate them at body heat. The organisms multiply and form colonies. Fresh sub-cultures may then be made, so as to isolate the required organism as a pure strain. The colonies of the growth are scraped off the surface of the culture medium, and transferred to normal saline solution, so as to form a uniform emulsion. Standardization is effected by counting the bacteria in the emulsion by means of a Thoma-Zeiss pipette, as used for blood counts, or by measurement of opacity. In the majority of laboratories, the emulsion is heated to 60° C. for an hour, to ensure sterilization. In others heat is avoided, the sterilization being secured by the addition of a little antiseptic (e.g., 0.1-0.3% Iukresol). These methods effect the death of the micro-organisms. After being standardized (e.g., 1,000 million in 1 c.c., etc.), the vaccine is either put up in small bottles with paraffined rubber tops, which can be pierced by the hypodermic syringe needle as necessary, or it may be diluted to yield appropriate doses per cubic centimetre (e.g., 5, 10, 25 million, etc.) and transferred to small glass ampoules which are sealed in the blow-pipe flame.

DOSES OF VACCINES

In the vast majority of acute infections, vaccines should not be used, on account of the great danger of the negative phase. Not only the original dose, but also the intervals between successive administrations, must be carefully regulated by reference to the constitutional reaction of the patient.

The following doses refer to carefully prepared autogenous vaccines; stock vaccines prepared by commercial houses are less potent and the dose suggested by the manufacturers should be employed.

<i>Name of Vaccine</i>	<i>Approximate Doses</i>	<i>Interval between Doses</i>
Acne Bacillus . . .	5 M initial, increasing to 100 M.	7 to 10 days
Acne B + Staphylococcus . . .	Acne 5 M initial. Staphylococcus 100 M.	7 days.
Catarrh (combined) . . .	25 to 250 M.	For Treatment, 10 days For Immunizing, 3 months
Cholera (prophylactic) . . .	I. Dose 1,000 to 5,000 M. II. Dose 2,000 to 10,000 M.	After 5 to 6 days.
Coli Bacillus . . .	Acute 25 to 10 M. Chronic 250 to 500 M	4 to 7 days. 7 to 10 days.
Friedländer's Bacillus . . .	5 to 125 M.	7 to 10 days.
Gonococcus . . .	Acute 1 to 5 M. Chronic up to 100 M	3 to 5 days. 10 to 14 days.
Hay Fever . . .	According to reaction. For intensive treatment.	7 to 10 days.
Influenza Bacillus . . .	Prophylactic: I. Dose 250 M. II. Dose 500 M. Curative: Acute 5 to 25 M Chronic up to 100 M	Every day. 10 days 7 to 10 days.

Name of Vaccine	Approximate Doses	Interval between Doses
<i>Micrococcus catarrhalis</i>	25 to 100 M	5 to 7 days
<i>Micrococcus melittensis</i>	10 to 250 M	5 days
Pneumococcus	Acute 5 to 50 M	2 days
	Chronic up to 500 M	7 to 10 days.
Staphylococcus	Initial dose 100 M	
	Up to 1,000 or even 5,000 M	7 to 10 days
Streptococcus	Acute 2½ to 10 M	3 to 5 days
	Chronic up to 50 M	7 to 10 days
Tuberculin T.R.	Curative	
	0.00001 c.c. upwards	10 to 14 days
Tuberculin B.E.	Curative	
	0.00001 c.c. upwards	10 to 14 days
Tuberculin T.A.	Diagnostic subcutaneous	A rapid increase in the size of the dose at short intervals, until the signs of reaction, if any, are produced
	0.2 c.mm., 1 c.mm., 5 c.mm., 10 c.mm.	
	Diagnostic cutaneous von Pirquet	
Typhoid and Paratyphoid	Prophylactic	
	I. Dose 500 M Typh with 250 M each Paratyph. A & B	
	II Dose 1,000 M Typh with 500 M each Paratyph A & B	Not less than 10 or more than 14 days
Typhoid, Paratyphoid, and Cholera	As above with addition of Cholera I Dose 5,000 M II Dose 10,000 M	Not less than 10 or more than 14 days
Whooping-cough	5 to 500 M According to age	4 to 5 days

VACCINE LYMPH

Vaccination is the inoculation of lymph containing the virus of vaccinia or cow-pox. This was introduced in 1798 by Jenner as he believed there was a close relationship between cow-pox and small-pox. This, however, was not scientifically proved until Copeman in 1902 inoculated the virus of smallpox into a monkey, and a calf vaccinated from the monkey developed cow-pox.

Vaccine lymph is prepared by vaccinating the abdominal surface of specially selected and examined calves, which have been kept in quarantine. Although precautions are taken to maintain sterility, the lymph is not sterile, and tests have to be applied to every batch to see that no dangerous bacteria are present; the dangerous organisms are those belonging to the gas-producing anaerobes, such as *B. perfringens* and haemolytic streptococci.

Glycerin is added as a disinfectant and in time destroys the greater number of the harmful bacteria, but no batch of lymph is passed for use until the total number of bacteria has fallen to 5,000 per c.c. It is then put up in glass capillary tubes and stored at 0° C. The lymph rapidly loses its potency when stored at higher temperatures.

The Therapeutic Substances Regulation, Great Britain, 1927, requires a printed label to be attached, to the effect that the storage temperature must be below 10° C., otherwise the potency cannot be

guaranteed beyond seven days. The potency of lymph used in England is very high, as it is required by law that the degree of potency shall be such that the characteristic skin lesions of vaccinia are produced when the lymph is diluted one-thousand-fold.

PREPARATION OF IMMUNE SERA

Sera are usually prepared by injecting the exotoxins of the particular bacteria into healthy horses in gradually increasing amounts. The horses are carefully chosen, and, before selection, they are proved by the mallein test to be free from glanders. In the case of diphtheria antitoxin, the strength of the exotoxin used for inoculation is ascertained by estimating its lethal effect on guinea-pigs of standard weight. The progress of the horse's immunization to the exotoxin is tested from time to time, and when the content of the horse's serum in antitoxin has reached a satisfactory point, the horse is bled. The blood, collected with aseptic precautions, is allowed to clot, and the serum which separates out, constitutes the antitoxin required. This antitoxic serum is tested for sterility and absence of any contamination or impurity, and then standardized.

For the production of some sera, horses are inoculated with bacteria themselves (endotoxin) instead of with their exotoxin. In the case of bactericidal sera, such as anti-pneumococcus serum, various methods have been employed from time to time, in order to procure a potent remedy. One method is to inject the horse with cocci whose virulence has been raised by passage through susceptible animals. Another is to use cocci derived directly from the human host, without loss of virulence by sub-culture. Living cocci are sometimes injected after the horse has been partially immunized by receiving graduated doses of dead cocci, with the hope that, by this means, a serum will be obtained which is richer in antibody.

PREPARATION OF TOXINS AND TOXOIDS

The filtrate of a culture in which a strain of bacteria has been growing, contains the toxins of the organism, and such a preparation, after testing for sterility and potency, is used in obtaining active immunization in scarlet fever. In the case of diphtheria immunization, the toxin is modified and reduced in toxicity (toxoid) by means of formalin and heat, so that several times the human dose produces no symptoms in guinea-pigs but makes the animals immune. It is, therefore, atoxic but still antigenic, i. e., of good immunizing power. In practice, it has been usual in the past to add a little diphtheria antitoxin to the toxoid (toxoid-antitoxin mixture). Diphtheria toxoid, without any added antitoxin, is now, however, frequently used, as is tetanus toxoid.

SCHICK-TEST TOXIN

This test is used to determine whether a person is susceptible or immune to diphtheria. This depends upon the amount of diphtheria antitoxin present in the blood and tissues; if it is less than a certain

amount the patient is susceptible, but can be made immune by the use of diphtheria prophylactic.

The test consists of injecting into the skin of the forearm a small, accurately estimated amount of diphtheria toxin (the dose is always 0.2 c.c. in volume). If the patient has not enough antitoxin in his tissues to neutralize the injected toxin, a reaction takes place in about 24 hours, which consists of an area of redness around the site of inoculation. The patient is then said to be susceptible, or Schick-positive. If there is no area of redness, he is immune, or Schick-negative.

The percentage of people immune has been found to vary a good deal at different ages. In cities about 80% of the adult population are immune. With children the percentage of immunity rises from 10% at one year, to 20% at three years, 40% at six years, 60% at about ten years; these figures, however, only apply to thickly populated districts.

SCHICK CONTROL.—As Schick toxin is diphtheria toxin it follows that it is a broth filtrate containing the constituents of the broth as well as diphtheria toxin and toxoid. As these non-specific substances in some people cause a reaction similar to the specific toxin, it becomes necessary to distinguish between the two. This can be done by heating some of the diphtheria toxin to 70° C. for five minutes, which destroys it. An amount of this destroyed toxin equal to the Schick toxin is injected into the opposite forearm, and the two sites are compared for a few days. The patient is then only said to be Schick-positive when the area of inflammation produced by the Schick toxin is unquestionably greater than that produced by the Schick control.

Note.—This injection should be made into, not under the skin, with a fine needle, the bevelled point of which should only be 1 mm. long.

DIPHTHERIA PROPHYLACTIC.—This is prepared in several different ways, but the strength is adjusted so that 1 c.c. is given by three hypodermic injections at intervals of three weeks. The majority of people become Schick-negative after the third injection, and the immunity lasts for a very long time. The value as a preventive measure in institutions has been repeatedly confirmed.

SCARLET FEVER

Attempts have been made to conquer this disease on the same lines as in the case of diphtheria; at present they are in a relatively early stage, but further progress is likely to be made. There are four points to be considered:

1. **DICK-TEST TOXIN AND DICK CONTROL.**—The Dick-test toxin, Dick control and method of preparing the test correspond with the Schick reagents and the method used in the case of diphtheria.

The Dick-test toxin is prepared in the same way as the scarlet fever toxin used for immunizing horses, i.e., a sterile filtrate from a broth culture of the haemolytic streptococcus of scarlet fever.

2. **SCARLET FEVER PROPHYLACTIC.**—This is used to render

immune those found by the Dick test to be susceptible to scarlet fever; while it has the same object, scarlet fever prophylactic is merely a diluted form of scarlet fever toxin exactly like Dick-test toxin, and is measured in terms of skin-test dose, being about one-sixth of the amount of toxin ordinarily used in the Dick test. The first injection is 500 skin-test doses, followed by doses of 1,000, 5,000 and 10,000 at intervals of one week.

The Dick test and scarlet fever prophylactic are of value in immunizing the nursing staff of fever hospitals.

3. SCARLET FEVER ANTITOXIN.—This is prepared in a similar manner to diphtheria antitoxin, a toxin being first obtained by growing a special strain of the scarlet fever streptococcus. Antitoxin is injected either subcutaneously, intramuscularly or intravenously in doses of from 10 to 50 c.c. in the early stages of the disease.

4. SCHULTZ-CHARLTON TEST.—This is to diagnose a rash which may or may not be that of scarlet fever. An intradermal injection is made of 0.2 c.c. of scarlet fever antitoxin. If the rash is due to scarlet fever and is not more than 60 hours old, the antitoxin will cause the rash to disappear around the site of injection, the bleaching beginning about eight hours after injection and lasting for a day.

KEEPING QUALITIES OF SERA AND VACCINES

In the case of the antitoxin sera, both unconcentrated and concentrated, viz., those prepared for use in diphtheria, tetanus, scarlet fever, dysentery (Shiga) and gas-gangrene (*B. welchii*), the experimental determination of the activity can be made with such precision that the rate of deterioration can be determined with accuracy. In these cases, therefore, it can be stated with certainty that the sera, if kept under the indicated conditions of cold storage, will be of at least the stated value on the date indicated, and may be expected to deteriorate at a definite and very slow rate (not more than 10% per annum) thereafter, so that they may be used with confidence for a considerable period after the date in question.

Less quantitative evidence is accessible as to the keeping properties of typhoid vaccine. Bacteriological evidence shows that typhoid vaccine loses part of its antigenic properties in about nine months after the date given; it could, however, be used justifiably for some weeks after the date on the wrapper, if fresh supplies were not available.

In the case of the anti-bacterial sera, and of vaccines in general, the available evidence has not the same precision. The date chosen is based, however, on general observations, both of a clinical and bacteriological nature, and, as further evidence accumulates, the method of dating these preparations will, if necessary, be modified. Meanwhile, it may be said that the date chosen is well within the expectation of permanence in the light of present knowledge.

For use in the tropics, "Wellcome" Brand Diphtheria Toxin for the Schick test is issued *undiluted in capillary tubes*, in response to numerous inquiries from clinicians. Though experience indicates that, when carried and kept in cold storage, there is little risk of the

toxin being rendered unfit for use before it reaches tropical parts, it must be clearly understood that this risk must be taken by the clinician, and that the toxin is issued on this condition only.

The toxin retains its full potency for many months, when stored in an ordinary room in England. At a temperature of 70° F., it is still potent after 4-6 weeks, but at 98° F., the toxin has lost a good deal of its potency within 1-2 weeks. Samples of the toxin, returned to England from India and China after a short period of storage, have been examined, and it has been found that, even after the double journey in cold storage, none was too weak to give a satisfactory Schick-test result.

The toxin, when diluted ready for use, is relatively unstable. Exposure to heat or light will materially affect it. The toxin dilution should, therefore, be used immediately after it has been prepared, and any that is left thrown away. If kept in an ice chest it is usually of full potency for at least two weeks.

It is wise to test a number of people at one time. Besides being economical, this affords an important control.

If in a group of people tested at one time a certain number give a positive reaction, it can be taken that the toxin dilution is acting properly. If, on the other hand, in a group of, for example, a dozen Europeans, no positive reactions were met with, it would be justifiable to suspect that the toxin was not fully potent.

The potency of "Wellcome" Diphtheria Prophylactic and "Wellcome" Scarlet Fever Prophylactic is retained for a lengthy period under ordinary conditions of storage in England. In the tropics, it would be wise to use it as soon after receipt as possible.

HYPERSENSITIVENESS

Hypersensitiveness includes anaphylaxis and atopy.

ANAPHYLAXIS.—This was at first believed to be exactly opposite to immunity, but is now considered to be two stages of one reaction. It is produced only by substances which can cause the formation of antibodies. The reaction is due to some inter-action which occurs between the tissues and the antigen.

The readiness with which anaphylaxis can be produced and the severity of the reaction vary greatly in different animals. Most experimental work has been done on guinea-pigs, because anaphylaxis can be more easily induced and is more violent than in any other animal, but experimental and clinical anaphylaxis are two entirely distinct conditions; it is confusion of the two which has led to the fear of fatal results from the use of therapeutic sera. It is doubtful whether anaphylaxis can be induced in a normal person. Severe and even fatal reactions in hypersensitive persons have followed a first injection of serum, but persons who show no reaction to the first injection do not acquire anaphylaxis and show sensitiveness to a second injection.

Therefore it is with the first injection that care must be taken, and in all doubtful cases, such as those with an asthmatic history, 2 or 3 m of the serum is injected intradermally, not subcutaneously,

and the formation of a small blanched area with weal formation watched for. In proportion as this area is marked, so is the patient's degree of liability to anaphylaxis, and if this liability is definite, the patient should be desensitized by $\frac{1}{2}$ -1 c.c. of the serum given 2 or 3 hours before the chief dose. Children are less liable to anaphylaxis than adults.

Should alarming symptoms arise, such as collapse, give adrenalin (1 in 1,000) 5-10 minims hypodermically.

It is important to give a second dose of serum even if it is not needed from the clinical point of view, within seven days of the first, in order to produce a condition of anti-anaphylaxis.

ATOPY.—This is an inherited hypersensitiveness which can manifest itself in a variety of ways, such as urticaria, gastro-intestinal symptoms, asthma, eczema, migraine and hay fever. There is hypersensitiveness to certain proteins which occur in dust, hair, etc.—or the proteins are in food, for example, egg albumin. The skin and conjunctiva are sensitive to the exciting protein, and can be determined by skin tests; if a solution of the suspected protein is rubbed into a superficially scarified patch, a positive reaction will be shown in a few minutes by a weal of variable size. It is due to the presence in the patient's blood of a reacting body, and is inherited probably as a Mendelian dominant character.

VASOMOTOR REACTIONS.—The intravenous injection of Salvarsan, colloidal metals and many other substances produces a toxic reaction, which in a way is like anaphylactic reaction. These reactions were at one time thought to be due to distilled water, which had been allowed to stand; this may contain as many as 100,000 bacteria per c.c., and intravenous injection of dead bodies of bacteria certainly can produce a violent reaction. But vasomotor reaction occurs even when water is used that was sterilized immediately after distillation.

REACTIONS FROM THE PRODUCTS OF PROTEIN BREAKDOWN.—The following are some of the more important: peptones—substances formed during the coagulation of the blood, which have a strong vasoconstrictor action and probably originate in the blood platelets; substances formed after injury to the tissues, especially by burns or wounds; products formed from the partial breakdown of amino acids, i.e. histamine, indole, tyramine; and also from the breakdown of lecithin, i.e. choline and neurine.

SPERMATORRHOEA

There is no such disease, but youths and even middle-aged men with a morbid interest in their genital organs often mistake for seminal fluid a phosphatic deposit, prostatic secretion squeezed out while passing a motion, or even a chronic gleet. Nocturnal emissions are a normal phenomenon of virile youth and often occur once or twice a week, while "that schoolboy erection" which characterizes the waking period of many a youth is merely due to a full bladder, the nervi erigentes controlling both the sphincter vesicae and the erectile mechanism.

TREATMENT.—This is by reassurance, acid sodium phosphate

or ammonium chloride if the urine deposits phosphates, laxatives if the patient is constipated, and chemotherapy if he has a gleet.

Nocturnal emissions can be lessened by taking a saline laxative three or four hours before bedtime and thereby avoiding pelvic congestion, by giving bromides at bedtime, by giving the patient a hard bed and not too many bed-clothes, or by the old device of tying some hard object, such as a cotton reel, in the middle of his back in order to prevent him from lying on it. The natural remedy is a wife.

SPINAL ANALGESIA—*See Anaesthesia.*

SPINAL CARIES

The treatment is complete immobilization until natural ankylosis or cure takes place. A plaster-of-Paris or Cellophane jacket, applied as for spinal fracture (*q.v.*) must be worn for many months. Albee's or Hibbs's operation for immobilizing the spine by bone grafts or artificial ankylosis is suitable in some cases, but must be supplemented by a plaster jacket until ankylosis is firm. Leather jackets with metal supports may be used when convalescence is firmly established, that is when the spine is firmly united, but not before.

GENERAL TREATMENT.—This is as for other forms of surgical tuberculosis, namely, good food, fresh cool clear air, sunlight, vitamins, especially vitamin D, and calcium.

The treatment of any case of spinal caries should be begun in a special institution, not only because the necessary plaster jacket or operation is best made or done there, but because the patient is properly taught the best way to live.

SPLEEN, RUPTURED

Rupture of an enlarged malarial spleen may cause death from haemorrhage in a few minutes, but, on the other hand, urgent symptoms may be delayed for several hours. These cases are very important from the medico-legal standpoint, and frequently give rise to considerable controversy.

Examples of cases which have come under the writer's notice (E. J. O'M.) are:

A coolie running along the railway line caught his foot in a signal wire and fell across a rail. Urgent symptoms immediately supervened and the man died within 20 minutes. The spleen was enormously enlarged. A syce received a comparatively slight blow on the abdomen. He did his work and did not complain until 6 hours after the injury, when the symptoms gradually became much worse, death taking place after 15 hours.

A punkah coolie was struck in the abdomen about midnight. Next morning at 10 a.m. he started to walk to his home, a distance of 7 or 8 miles. He walked the first 3 or 4 miles, then rode a pony. He collapsed and died on reaching his house.

Post-mortem examination of these cases showed very extensive rupture, which would have caused rapid death. The explanation

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Post-mortem examination of these cases showed very extensive rupture, which would have caused rapid death. The explanation

apparently is that the injury causes a haemorrhage into the splenic substance, which ultimately ruptures the splenic capsule by distension.

SYMPTOMS.—These are of abdominal injury with severe internal haemorrhage. The blood causes dullness in the splenic area which steadily increases.

TREATMENT.—Immediate operation is the only hope. The surgeon, standing on the right side, makes a free incision through the left rectus. The spleen being exposed a clamp is at once placed on the pedicle. If there are no adhesions the operation is simple, but when adhesions are present, the operation is long and tedious as all adhesions must be divided between double ligatures, then the spleen is turned forward and to the right, the gastro-splenic omentum and lienorenal ligament being divided between ligatures, care being taken that the tail of the pancreas is not injured.

The pedicle is now dealt with from the posterior aspect and working from below upwards, the vessels being separated with the fingers and double-ligatured, tension on the pedicle being avoided.

If oozing is feared, the cavity left by removal of the spleen should be packed with gauze; otherwise, the abdomen should be closed. No serious ill-effects follow the removal of the spleen.

SPLENIC ANAEMIA

Although in India this disease is much less common than malaria, the writer has seen many cases, especially in children, wrongly diagnosed as malaria; kala-azar is another diagnosis sometimes made, but repeated absence of the causative parasites and of any response to specific therapy should correct these errors.

There are usually considered to be two forms of the disease, the juvenile (Banti's disease) and the adult; there is also the rare von Jaksch's disease; the classical syndrome is enlargement of the spleen accompanied by microcytic anaemia and associated with or followed by cirrhosis of the liver, engorgement of the gastric veins, and haematemesis.

In the adult type cirrhosis of the liver does not occur, and the haematemesis is due more to a general haemorrhagic diathesis than to local conditions.

TREATMENT.—Splenectomy is less popular now than formerly for two reasons; in the juvenile type it does not always prevent the later onset of cirrhosis, and in the adult type equally good results are claimed for massive iron therapy and blood transfusions.

SPRAINS (See also Dislocations.)

Many a fracture in or near a joint is diagnosed as "sprain", so in all cases an X-ray photograph in two planes should be taken—screen examination is useless. If symptoms of a "sprained wrist" persist, an X-ray photograph should be taken again after three

weeks, by which time a fracture of the waist of the scaphoid, invisible at first, may be seen.

Roughly, sprains can be divided into two classes, (a) those in which there has been actual displacement, which means that a ligament has been ruptured, and (b) those in which the ligaments have merely undergone painful stretching.

The former require immobilization in plaster of Paris for 8-10 weeks in order to allow the torn ligaments to mend; the latter respond to palliative measures such as infiltration with a local anaesthetic, cold-water bandages, massage, radiant heat, Elastoplast arranged so as to take strain off the injured ligament, or, in the case of the ankle, raising the heel and sole of the shoe on the injured side.

SPRUE

Although the aetiology of sprue remains obscure recent advances in treatment are encouraging.

SYMPTOMS.—*The leading symptoms* of the fully-developed disease are the passage of several pale, frothy, bulky, fatty stools, particularly in the early morning, flatulence, sore tongue, macrocytic anaemia, hypochlorhydria, lassitude and loss of weight.

TREATMENT.—On the theory that sprue is a deficiency disease, nicotinic acid (300-500 mg. a day) and riboflavin (2-10 mg. a day), both of which are components of the vitamin B complex, have been given, together with large doses of crude liver extracts. If it appears that the vitamins are not being absorbed from the gastro-intestinal tract they may be given by injection. A simple test is to give three or four tablets of nicotinic acid on an empty stomach; if the acid is being absorbed the patient soon flushes and feels a characteristic tingling. Should this not occur the test may be repeated later with a larger dose.

Some years ago the writer had considerable success with daily doses of 4 c.c. of Campolon, Plexan or Hepatex T; these were given for a week. Next week the injection was given every other day and thereafter twice a week. More recently he has supplemented this with nicotinic acid and riboflavin and the results have been better.

For the gastro-intestinal disturbances the old-fashioned "Simla Mixture" is excellent in mild cases. It is:

R Bismuth. Salicylat. . . . .	..	..	..	gr. 20
Liquor. Hydrarg. Perchlor. . .	.	.	.	5j
Aq. Menth. Pip. ad . . . . .	..	..	..	3j

New Drugs.—

Thymine or 5-methyl uracil (Lederle; Hoffmann-La Roche); the average dose is 7.5 grammes in water twice daily for 14 days, followed by 2.5 grammes twice daily for 16 days, and thereafter as required, a suggested maintenance dose being 2 grammes daily.

Folic Acid (Lederle); Average dose 20 mg. daily for 14 days followed by a maintenance dose of 15 mg. daily; the substance is

non-toxic, but massive doses have no more effect than those mentioned.

Very promising results have followed the above methods of treatment; the former particularly controls the "bowel component" and the latter the anaemia.

Climate.—It is generally recommended that sufferers from sprue, who are often but not always Europeans, should leave the tropics, never to return. When this means leaving his only source of livelihood the patient does not welcome the advice. In India, a transfer from a damp to a dry climate can often be arranged, and when possible should be done, but not until real efforts on the above lines, and by dieting, have been made. Modern treatment has greatly improved the prognosis, and both in this and in other diseases, "invaliding to the U.K." should be considered a confession of failure, and not, as is so often thought, equivalent to a cure. Scientific medicine is not learnt by "passing the baby."

STAMMERING

The onset in adult life is rare; it generally begins in children between five and six years, and it is of importance in the initial stages to insist on slow and deliberate speech with firm vocal tone. If correction is carried out on these lines nervous stammerers will not develop. In the developed case it is necessary to discover which part of the mechanism of speech is at fault; to discover this the patient should read aloud with an uncovered chest, and it will be found that it is either necessary to increase the vital capacity of the lungs by breathing exercises, or to control expiration, or that the chest is not being kept full of air during speech. Re-educational exercises are required in these cases, not psycho-analysis.

STARVATION

Patients with starvation require very gentle treatment, and an ordinary meal given to a starving man would probably kill him—if he could swallow it.

It must be remembered that owing to disease and lack of nutrition the enzyme-forming and the nourishment-absorbing cells in the pancreas and small intestine are not working, and they require very careful training to bring them back to normal.

PROTEIN.—Shortage of protein is one of the chief factors in starvation, and although its replacement is urgent it is also difficult because it cannot be absorbed by the devitalized tissues and because a certain amount of "fuel" is necessary to generate the energy required for its absorption. Fortunately the fuel is available in the form of glucose, but this, in turn, requires vitamin B for its oxidation. so teaspoonful sips of 10%-20% glucose with added vitamin B should be given slowly by the mouth before protein feeding is attempted. The vitamin B may be given by injection, crude liver-extract being an excellent form of it.

Janet Vaughan and others, working at Belsen camp, found that for introducing protein nothing could compare with double-strength

plasma injections into the vein, one to two litres being given in 24 hours for two or more days according to the condition of the patient. Protein hydrolysates, that is, partly digested proteins with amino acids, although theoretically suitable, were a complete failure both by the vein and by the mouth. "The hydrolysates given by the mouth proved the worst fiasco of all. The substance had a very unpleasant flavour and many patients having taken 300 c.c. curled up and preferred to die rather than take any more. . . . On the other hand, milk and glucose-vitamin mixture answered extremely well. There were not more than 5% of the patients at Belsen who would not take fluids by the mouth. Many of these patients had sore ulcerated mouths . . . it was found useful to flavour the milk with tea or coffee or other flavourings. Starving people craved not only for food, but for familiar food. There was no difficulty in getting them to take milk, and no abdominal discomfort followed, but it had to be given frequently, in small doses."

The preparation of hydrolysates therefore needs to be considerably improved before they can be wholeheartedly recommended.

Further, she says: "There was danger in pushing fluids into these starved people. A litre of fluid given intravenously, together with what they wanted to take by the mouth, was probably sufficient."

Hugh Stannus, working among starving prisoners of war, records the following experience with a patient in the last stages of emaciation and dehydration and regarded as unlikely to live another day. "He had difficulty in taking his milk diet. It seemed to be a case demanding intravenous hydrolysates, but none were available, and the man was therefore given glucose-saline intravenous therapy, a crude liver-extract parenterally, and teaspoonful feeding with powdered liver substituted for milk diet. The response was dramatic, and a second case responded in like manner."

The writer's experience in hospitals in India has taught him that many starving patients will digest sweetened condensed milk when they will digest nothing else; it is also extremely palatable.

In the case of vegetarian patients, a life-saving deception is permissible, and if they are given animal protein in the form of liver, plasma or egg albumen, they may be told quite truthfully that it is medicine.

To sum up: give glucose and vitamin B first, then protein; give double-strength plasma intravenously if possible; everything by the mouth must be given in small, frequent doses. Do not give more than one or at most two litres of fluid by the vein in 24 hours. Give crude liver-extract parenterally; remember the value of sweetened condensed milk and powdered liver.

These patients often have bacillary dysentery as well, for which sulphaguanidine will be required. If dehydration from dysentery is very severe, consider giving hypertonic glucose-saline.

STINGS AND BITES OF INSECTS

MOSQUITOES AND SAND-FLIES.—Milton dabbled on with the finger is the best application as it is both neutralizing and antiseptic; ammonia, spirit, menthol or solution of bicarbonate of soda are also effective.

BEEES, WASPS AND HORNETS.—Examine with a magnifying glass in a strong light to see whether the sting has been left in the skin; if so remove it by digging it out with a clean knife-point or needle, then apply a clean handkerchief soaked in a 10% solution of Milton or 2% ammonia. If the sting is in the wound do not squeeze it, because the bee often leaves the poison glands behind as well.

Some people are more allergic to insect bites than others, and a hornet bite can cause very severe local reaction with generalized sweating and collapse. The treatment is the injection of adrenaline.

In cases of multiple stings the primary need may be to treat shock; hot drinks and injections of adrenaline and Coramine being the chief first-aid remedies. In Burma the writer saw several fatalities among adventurous soldiers hunting for hooey in the jungle, and two in children who fell into a hornets' nest.

SCORPIONS.—These bite chiefly at night and cause severe local pain and swelling; there may also be general symptoms such as collapse and faintness, but these are often due to fright.

Treatment.—An injection of one or two c.c. of 2% Novocain or 1% cocaine with a few minims of adrenaline gives the greatest relief. The venom may be sucked out of the wound and, if considered necessary, a proximal ligature applied.

CENTIPEDE BITES.—These are treated on similar lines, ammonia being a useful local application.

SPIDER AND TARANTULA BITES.—Treat as wasp or scorpion bites according to severity.

JELLYFISH STINGS, e.g., "Portuguese Man-of-War."—These are locally painful and may produce severe general symptoms in the allergic. The usual local remedy is vinegar and the best general remedy is adrenaline, together with Coramine.

LEECH BITES.—To detach a leech, apply salt, vinegar or a lighted cigarette, and to stop the bleeding apply a firm pad and bandage.

(See also Air Passages, Foreign Bodies in.)

STOMACH, CARCINOMA OF

Recent indigestion in a middle-aged man always calls for careful X-ray examination, a test meal, and examination of the stools for occult blood, but even in early cases of carcinoma treated by partial or total gastrectomy the recurrence rate is about 75% within five years. By the time a lump can be felt, curative treatment is usually impossible, and X-rays and radium have so far proved of little value in this disease. If there is obstruction with dilatation, a gastrostomy or enterostomy brings relief by preventing the dilatation and making it possible to feed the patient.

Washing out the stomach two or three times a day with a weak bicarbonate of soda solution may relieve the pain and discomfort, but sooner or later morphia is needed in increasing doses, and in a killing disease of this sort there is no reason for withholding it; most patients die within a year of the diagnosis being made.

STOMACH, ACUTE DILATATION OF

This sometimes occurs after operations and should always be suspected if the patient feels undue epigastric discomfort and has a rising pulse. *In cases of doubt always pass a Ryle's tube*; this causes no discomfort and may save life. The contents of the stomach are aspirated with an ear syringe until no more comes away, and then measured. Aspiration should be repeated hourly or a gravity drainage apparatus fixed up. The tube must be left in place at least 48 hours and not removed until Bailey's "gastric mobility test" has been carried out. This is done by emptying the patient's stomach by means of the tube and then giving him a measured quantity, e.g., 6 oz., of a weak methylene blue solution to drink. The stomach is emptied three hours later and little or no blue solution should be withdrawn.

Intravenous salines are given to replace the fluid lost.

The foot of the bed should be raised, but modern opinion is against turning the patient on his stomach if the aspiration can be satisfactorily carried out with him on his back or his side.

STOMATITIS

ACUTE STOMATITIS.—This is generally a sign of debility, avitaminosis or some other general disease, which should be looked for and treated. Very occasionally, especially if there is ulceration of the cheek, the cause may be leukaemia. Swabs should be taken and examined when possible, and obvious local conditions such as carious teeth or badly fitting dentures appropriately dealt with.

TREATMENT.—The mouth should be rinsed with normal saline, bicarbonate of soda or weak Milton solution after each meal; the following mouth washes are also useful. They are used undiluted.

℞ Sod. Bicarb.	gr. 20	℞ Potass. Chlorat.	.. gr. 30
Boracic ..	5j	Boracic ..	.. 5j
Glycerin. ..	5j	Tinct. Myrrh ..	.. 5j
Aq. ad ..	3vi	Aq. ad ..	.. 3viii

In severe cases chemotherapy is the best treatment. Vitamins, especially ascorbic and nicotinic acids, should be given in full doses.

APHTHOUS STOMATITIS.—This occurs in feeble young children as a crop of small greyish ulcers.

TREATMENT.—General tonic treatment is required. Local treatment consists in gently swabbing out the mouth after each meal and applying glycerin and borax on the finger or on a swab. In resistant cases touch the ulcers with silver nitrate.

Hallam has had great success with the following mixture:

R. Sodii Thiosulphat.	..	..	..	gr. 10
Tinct. Card. Co.	..	..	..	℥ 5
Aq. ad	..	..	..	3ss
Half an ounce to be taken three times a day after food for a week. (Adult dose.)				

THRUSH.—This is distinguished from the above by the fact that it occurs as large white or greyish spots, usually beginning on the tongue and sometimes spreading all over the mouth. It is commonest in babies and is due to dirty bottle teats, but the writer has seen it in debilitated adults. The cause is a fungus or a yeast, *Oidium albicans*.

TREATMENT.—This is as for aphthous stomatitis, and special care must be taken to cleanse and disinfect all bottles, teats, etc. Hurst recommends the local application of sodium sulphate solution, one drachm to the ounce, after which the fungus is scraped off, or gentian violet may be applied.

When a localized ulcer, especially on the lip, is indolent, remember syphilis. A mucous patch here is highly infective, as is a chancre.

CANCERUM ORIS.—This is found in debilitated children, especially after measles, but it may occur after smallpox or malaria.

TREATMENT.—This is by intramuscular penicillin, 20,000–40,000 units every three hours after an initial injection of 100,000 units. Local treatment is by eusol dressings or sulphathiazole powder; plastic surgery may be needed later.

ULCERATIVE STOMATITIS ("Trench Mouth").—This is due to Vincent's spirillum, which may infect the sockets of the teeth. The condition is highly infectious—by means of towels and eating and drinking utensils.

The best local treatment is to apply Stovarsol, Novarsenobillon, or penicillin powder to the affected areas three times a day after thorough cleansing with hydrogen peroxide and soap or a soapy dentifrice. Under this treatment a startling improvement occurs within 24 hours. Vitamins, especially nicotinic acid, 250 mg. daily, should be given, and the general health attended to.

The heavy metals, especially mercury, and to a lesser degree, lead and gold, can also cause stomatitis; gold acts indirectly by causing agranulocytosis.

In India, a chronic ulcerative stomatitis develops inside the cheeks of people who have chewed "pan" for years; the teeth are generally affected by pyorrhoëa. As the ulceration is very likely to become malignant these cases must be watched carefully; the "pan" chewing should be stopped and the area carefully examined after thorough cleaning. If there is any suspicion of malignancy, X-ray or radium treatment is needed.

STONE—See Calculi.

STRANGULATED HERNIA—See Hernia.

STRICTURE—See Urine, Retention, Extravasation and Suppression.

SUBPHRENIC ABSCESS

This is uncommon and occurs after peritonitis, especially that which follows perforation of a viscus.

It is commoner on the right than on the left side and may resemble a liver abscess, but the base of the lung above it is usually affected.

Diagnosis is best made by a good radiologist, but a needle may—or may not—strike pus.

TREATMENT.—This is on the lines of the old operation for liver abscess, that is to say, the abscess is opened through one of the lowest intercostal spaces with careful precautions against infecting or opening the pleura; a portion of rib may be excised as in opening an empyema.

If the needle finds pus, the first treatment should be to wash out the abscess cavity, replace the pus by penicillin, 5,000 units per c.c., and give chemotherapy.

If the abscess tends to point it should be opened where it points.

SUFFOCATION—See Drowned, Treatment of the apparently.

SUNSTROKE—See Heat-Stroke.

SUPPRESSION OF URINE—See Urine, Retention, Extravasation and Suppression.

SYCOSIS BARBAE

TINEA BARBAE.—This form, the less common variety, may be acquired from horses or other animals or from dirty shaving brushes. The causative trichophyton will be found in scrapings taken for examination, but there is contamination of the hair follicles by the staphylococcus.

Treatment is as for ringworm (*q.v.*).

STAPHYLOCOCCAL SYCOSIS.—This is a chronic pustular inflammation of the hair follicles of the beard; it may also affect the eyebrows or axillae.

TREATMENT.—The hair should be kept shaved, or at any rate closely clipped, and crusts removed by swabbing with peroxide followed by boric lotion, after which the area is thoroughly dried and a penicillin cream applied. A good cream base is as follows:

B Lanette wax SX	}	15 parts of each
Vaseline			
Water 10				.. ..	100 parts

A thicker cream can be made by using less water, even up to equal parts of the three components.

The Lanette wax SX is shredded, and melted in a water bath and the Vaseline is added slowly with constant stirring. Warm water is now added in the same way and the emulsion stirred until cool; a concentrated solution of penicillin sufficient to make the strength in the emulsion 500–1,000 units per c.c. is now added and thoroughly

stirred in, after which the cream is put on ice or in the Frigidaire. It retains its activity for less than a week at room temperature and for more than a month if kept cold.

The cream should be applied twice a day for about a month, but rapid improvement occurs in the first few days.

If Lanette wax SX is not obtainable an emulsion can be made of equal parts of arachis oil and mucilage of tragacanth or acacia.

In syecosis an ointment is said to be less effective than a cream, but penicillin in Vaseline (500-1,000 units per c.c.) has been used successfully.

Intramuscular penicillin is not indicated in this disease. Sulphathiazole-penicillin ointment may be used, but in the writer's experience sulphathiazole alone or with flavine in an ointment is disappointing.

In severe cases it may be necessary to cause temporary epilation by means of X-rays, the greatest care being taken to apply the penicillin preparation as the beard begins to reappear, otherwise there may be a recurrence.

SYNCOPE—*See Heart Disease and Shock.*

SYNOVITIS, TRAUMATIC

This should be treated by rest, evaporating lotions and elastic pressure—weight bearing should be avoided until effusion has disappeared. If the amount of fluid is large, aspirate; if the effusion tends to become chronic a combination of pressure, splinting and counter-irritation, the latter by means of Scott's dressing, which to be effective must be reapplied every third day.

SYPHILIS—*See Venereal Diseases.*

TABES DORSALIS—*See Nervous System.*

TACHYCARDIA—*See Heart Disease.*

TAPE WORM—*See Worms.*

TEETH—*See Dental Surgery.*

TENDONS, DIVIDED

The same principle applies as in nerve suture; never suture a divided tendon if there is any risk of sepsis, but clean-cut tendons in a clean wound may be stitched.

If there is difficulty in finding the proximal end make a transverse incision about three inches proximal to the wound.

There are twenty-three tendons round the wrist joint; make sure that you unite the right ones.

Stitches are apt to cut out; the best stitch is inserted as follows:

- (a) Half an inch from the cut end pass a suture of linen thread or strong fine silk, with a needle at each end, right through the tendon.
- (b) Pass each needle obliquely through the tendon so that the

point emerges a little less than a quarter of an inch from the cut end.

- (c) Pass each needle obliquely so that the point emerges on the cut surface. Each side of the stitch thus has the shape of an "S" or "Z" with the lower limb dropped.
- (d) Do the same to the other end of the tendon and if necessary put a similar stitch at right angles.
- (e) Tie the knots *between the divided ends of the tendon* and cut the ends short. A smooth surface of normal diameter is thus left in the tendon sheath

When the tendon sheath has been destroyed or damaged the writer has used sterilized amniotic membrane to form a gliding surface with some success.

A tendon takes about 10 weeks to unite, but gentle active movements may be begun after about a month. The tendon is kept relaxed during recovery.

The flexor tendons of the fingers are best united by Bove's method, quoted by Bailey:

- (a) Expose both ends of the tendon.
- (b) Flex the finger.
- (c) About half an inch above and below the cut transfix the tendon with a pin from side to side.
- (d) Unite the cut ends with one or two fine silk stitches and close the wound.
- (e) Put the well-flexed finger in plaster of Paris which incorporates the pins.

When both the sublimis and the profundus flexors are cut in their sheath, suture the profundus only.

TENO-SYNOVITIS

Unless due to tubercle, gonorrhoea or some specific infection, a case of teno-synovitis of more than a few days' duration is best treated by complete immobilization in plaster of Paris for about two weeks, after which active movements are encouraged if all signs of inflammation have disappeared. A course of penicillin will help to combat any low-grade infection and septic foci should be eradicated.

TESTICLE, UNDESCENDED

In cold weather, put the patient in a hot bath to make certain the case really is one of undescended testicle, but testicles that are readily retracted out of the scrotum are apt to be under-developed.

In all cases hormone therapy should be given fair and repeated trials before operation is considered, and even if operation is performed hormones should be given before and after.

There are various types of case, and it is almost unnecessary to remark that the prognosis is much better in a patient who is otherwise normal than in one with *dystrophia adiposo-genitalis* or some

a wound which is possibly contaminated by a herbivorous animal's dung.

DIAGNOSIS.—In the writer's experience the "risus sardonius", a fixed, mirthless smile, is a trustworthy early sign and leads one to look for others, such as trismus, neck rigidity, abdominal rigidity, and a recent, tender wound, which may have healed or not. The writer has seen cases of early tetanus variously diagnosed as meningitis, cerebral malaria, rabies, or perforated viscus—but they all had a risus sardonius.

PROGNOSIS.—If symptoms appear in the first week after infection the patient will probably die; in the second, he may die; in the third, or later, he will probably live.

TREATMENT.—As in many other diseases, "shock tactics" appear to be the best in tetanus, so as soon as the diagnosis is made 200,000 (two hundred thousand) units of tetanus antitoxin should be given intravenously with half a c.c. of adrenaline solution. On the French theory that because anaesthetics are soluble in the lipoids of the nervous system they help to eliminate tetanus toxin, a general anaesthetic may be given beforehand.

Between fifty and a hundred thousand units of serum are given daily thereafter until convulsions cease.

Much argument has taken place about the efficacy of intrathecal antitoxin, the prevalent view being that it is useless by lumbar puncture but useful by cisternal puncture (for method, see Cisternal Puncture) in doses of about 50,000 units. Even so, the case is not proved and posterior basal meningitis is a reported sequel. The intravenous or intramuscular route is therefore recommended.

Penicillin.—This should be given at the earliest possible moment, the sooner it is given the greater being its effect; as it does not neutralize the toxins it should be given in conjunction with antitoxin, not alone; 20,000–30,000 units intramuscularly every three hours is the usual dose.

Treatment of the wound.—A fresh wound should be excised when possible, smaller wounds may be washed with hydrogen peroxide or permanganate of potash, or filled with penicillin solution, 1,000 units per c.c. When symptoms appear, a septic wound should have routine treatment, but an apparently clean or healed wound may be excised in order to remove the focus of tetanus bacilli; or it may be left alone, on the theory that a natural barrier has formed and should not be destroyed.

General treatment.—Silence, peace and semi-darkness are the primary necessities. In no disease is it so harmful "to wake the patient in order to give him his sleeping draught". At the same time, adequate nourishment is required, not always an easy matter when the jaws are clenched. A quiet and careful nurse can do a great deal by gentle use of a feeder containing egg flip, Horlicks, Benger's Food, or some such easily digested food. Alternatively, a baby's feeding bottle, with an enlarged hole in the teat, may be invaluable; even if the teeth are clenched, the patient can still suck,

and the food finds its way round and between the teeth. If the above methods fail, nasal feeding will be required, or rectal or intravenous glucose-salines.

Control of Spasms.—Curarine and Myanesin, given in doses sufficient to control the spasms but not to depress respiration unduly, are strongly recommended. The drugs may be given intramuscularly when the effect of the previous dose begins to wear off (usually between one and three hours) or by intravenous drip. A dose of Prostigmin with atropine should be kept ready in a syringe in case respiratory paralysis or bronchial spasm should develop.

Other remedies are sodium bromide, 30–60 grains 4-hourly; rectal paraldehyde, one drachm in one and a half ounces of normal saline per stone of body-weight, the maximum being 8 drachms in 12 ounces of saline; or rectal Averin (bromethol), 0.1 c.c. in 25 c.c. distilled water per kilo (2½ lb.) of body-weight; by the mouth Sodium Amytal, 3 grains every hour until the spasms are controlled, or Cyclonal, by the vein in severe cases. Failing the above, light chloroform anaesthesia may be given.

It must be remembered that many of these patients die from heart failure and exhaustion, caused by the convulsions, which are also very painful. As already remarked, the situation is desperate if symptoms come on early, so desperate remedies are needed; as in eclampsia, so in tetanus, the best way to save life is to prevent convulsions. Antitoxin cannot immediately detoxicate the damaged nervous tissue, but it can protect it from further injury, and curarine or the anaesthetics give the patient the chance of remaining alive until nature begins to repair the damage.

TETANY

As this is due to a low blood-calcium it may be relieved with dramatic suddenness by an intravenous or intramuscular injection of a calcium preparation such as Collosol Calcium, Calcium Sandoz or calcium gluconate; alternatively, 10 grains of calcium chloride may be given intravenously.

If there is deficient calcium absorption, as in chronic diarrhoea, coeliac disease, sprue or uraemia, it is advisable to continue injections once or twice a day; if, as in rickets, the deficient absorption is due to lack of vitamin D, this should be given; finally, if there is lack of calcium in the diet this should be supplemented and vitamin D given at the same time to ensure absorption. Liberal quantities of fresh milk and green vegetables should be given as well. In small children, tetany is most commonly due to rickets or chronic diarrhoea.

THREADWORMS—See Worms (Intestinal).

THRUSH—See Stomatitis.

THYROID DISEASE—See Goitre.

TIC DOULOUREUX—See Nervous System (Neuralgia).

TINEA CRURIS—See Dhobie Itch.

TINEA VERSICOLOR (PITYRIASIS VERSICOLOR)

This is a common and harmless fungous infection of the skin of the trunk by the *Microsporon furfur*; on light skins it looks brown, and on dark skins, grey.

TREATMENT.—Wash the skin with soap and warm water, dry it and then apply a solution of sodium thiosulphate (photographic "hypo"), about one part of crystals to two parts of water. The treatment is repeated daily for four or five days and the clothes are disinfected.

TINNITUS

This may be referred to the head generally or to one or both ears and may accompany any type of deafness, including that occurring in anaemia, renal and cardiac disease and that due to the administration of sodium salicylate and quinine. See special article on Diseases of the Ear.

TOE NAIL, INGROWING

If the case is seen before ulceration has begun, cut the nail square; this with cleanliness and general attention to the feet may cure the condition. Otherwise Sir Watson Cheyne's operation is recommended; under general anaesthesia a flap is cut from the outer side of the toe by entering the knife beyond the granulations and cutting to the extremity. The nail is now split from the free edge to the base by scissors, rather less than half of the affected side being removed, the corresponding portion of the matrix being removed back to its farthest point. If any portion of this matrix is left, the operation will be a failure. The flap is now united by sutures to the raw area from which the nail was removed.

TONGUE, DISEASES OF

TONGUE TIE.—It is extremely rare for the condition to persist as development of the tuberculum impar continues during infancy, therefore division is seldom necessary. On the other hand, tongue swallowing results from extreme length and looseness of the fraenum.

WOUNDS OF THE TONGUE.—These are usually from the teeth; haemorrhage is not severe except in some deep punctured wounds. Temporary arrest can then be made by hooking forward the whole tongue with the finger, thus putting the lingual arteries on the stretch.

ACUTE GLOSSITIS.—This is due to either staphylococcal or streptococcal infection. The swelling may extend to two or three times the normal size. Two longitudinal incisions, half an inch deep, in the dorsum cause immediate relief and usually rapid clearing up.

INFLAMMATORY DISEASE, CHRONIC.—The following is Butlin's classification:

- | | |
|-----------------------------|----------------------------------|
| 1. Erythema migrans. | 5. Herpes. |
| 2. Dyspeptic tongue. | 6. Leucoplakia. |
| 3. Furrows and wrinkles. | 7. Tuberculous. |
| 4. Glossodynia exfoliativa. | 8. Vitamin B complex deficiency. |

Speaking generally, the treatment of these conditions is cleanliness of the mouth and the use of a chlorate of potash mouth-wash, and the avoidance of all sources of irritation. Radium is not beneficial in cases of leucoplakia, and Butlin is averse to interference unless definite warty conditions are present. A paint of chromic acid 1-2 gr. to the ounce and ointments are useful applications to the tongue. The following are recommended by Butlin:

B Glycer. Acidi Carb	.. ℥ 30	R Ung. Acidi Borici	.. 3ss
Spirit Chloroformi	.. 5ij	Cocainae Hydrochlor.	.. gr. 3
Tr. Myrrh	.. 5j	Hydrous Lanolin	.. 3ss
Eau-de-Cologne ad	.. 3iv	To be gently rubbed into the tongue	
Two teaspoonfuls in 4 oz. warm		at bed-time.	
water.			

Chemotherapy is also required.

ULCERS OF THE TONGUE.—These are merely a further stage of the above conditions. Butlin's classification is:

- | | |
|--------------------------|----------------------|
| 1. Simple. | 6. Mercurial ulcers. |
| 2. Dyspeptic. | 7. Tuberculous. |
| 3. Herpetic. | 8. Syphilitic. |
| 4. Traumatic. | 9. Malignant. |
| 5. Ulcer of the fraecum. | |

The tongue may be attacked by syphilis in any of the three stages. Butlin's warning must be repeated: "Nothing leads to greater errors in diagnosis and treatment than to see syphilis in every form of obscure affection of the tongue, or to persist in the diagnosis of syphilis when a short and vigorous administration of anti-syphilitic remedies has proved of no service".

CARCINOMA OF THE TONGUE.—Treatment of this condition has undergone revision partly as a result of the introduction of diathermy and partly of radium therapy. All that can be said at present is that radium in certain types of cancer of the tongue gives as lasting results and is considerably less dangerous and mutilating than the radical measure of excision. The use of diathermy, either by the diathermy knife for excision or by the button for slowly cooking the growth, has lessened the dangers of operation. As regards the cervical lymphatic glands these must either be removed by block dissection or treated with the radium collar. While radium may ultimately prove the better treatment, at present it is wiser to excise the glands on one or both sides according to the position of the growth, irrespective of what treatment is used for the tongue.

TONSILLITIS

ACUTE TONSILLITIS.—This common disease is best treated by chemotherapy, combined with local applications. Most cases will yield to a combination of sulphadiazine, two tablets four times a day, and the local application of penicillin-sulphathiazole powder (100,000 units to a drachm) at frequent intervals. Alternatively the following gargle may be used:

R	Acid. Carbolic. Lq.	}	..	..	.	aa 3j
	Liquor. Polassae					
	Tinct. Lavand. Co.					
	Glycerin.					
	Aq. ad	..	..	.	3j	
	To be used frequently with an equal amount of hot water.					3viij

Sulphadiazine tablets must be given for at least five days otherwise the inflammation will recur.

Severe cases should be given intramuscular penicillin three-hourly. Whenever possible, a swab should be taken to exclude diphtheria.

CHRONIC TONSILLITIS.—The best treatment is removal of the tonsils.

Acute Pharyngitis is treated in the same way as acute tonsillitis.

QUINSY OR PERITONSILLAR ABSCESS.—Many early cases resolve under chemotherapy. If an abscess has to be opened, proceed as follows:

- Take a cataract knife, and hind some sticking plaster round the blade, half an inch from the point.
- With the point of the knife open the abscess about half an inch lateral to the base of the uvula.
- If pus does not escape freely, thrust a pair of sinus forceps into the incision and open them.
- As soon as the abscess is opened, the patient puts his head down, so that blood and pus run out of his mouth.

TONSILS AND ADENOIDS

Examination should be made with a good torch or head-light and the patient's tongue gently pressed down with a spatula; this is also used for squeezing pus or caseous material out of the crypts. Many patients can show their tonsils without the use of a spatula but the examination is necessarily less thorough. Palpation of the tonsillar glands behind the angles of the jaw, together with the rest of the glands of the neck also forms part of the examination.

Adenoids can be seen with a post-nasal mirror by those accustomed to its use, but to get a satisfactory view it is generally necessary to spray the pharynx with a local anaesthetic and to draw the soft palate and uvula forward. Alternatively, a finger hastily thrust up behind the soft palate may convey the necessary information; it may also get bitten.

If it is decided to remove the tonsils, the adenoids can best be examined at the time of the operation and removed if present, but occasionally they are present without any accompanying enlargement of the tonsils. The writer has seen this in children, and once in a man of 53, in whom it was causing a chronic middle-ear catarrh, with incipient deafness.

In India adenoids appear to be less commonly associated with enlarged tonsils than in Europe.

TONSILLECTOMY.—Indiscriminate tonsillectomy is now, mercifully, abandoned, but removal of the tonsils, and adenoids if present, should be advised in the following conditions:

- (a) Chronic hypertrophy; this is commonest in children (in whom the best age for tonsillectomy is between four and six), but is often seen in adolescents and adults.
- (b) Chronic or repeated inflammation, as shown by chronic or repeated enlargement or tenderness of the tonsils and tonsillar glands or by the presence of caseous material in the tonsillar crypts. This can be squeezed out by gentle massage and often has a foul smell, which it has been imparting to the patient's breath.
- (c) When the tonsils are justifiably suspected of forming a septic focus.
- (d) Many cases of tuberculous glands in the upper part of the neck are infected from the tonsils, which should therefore be removed.
- (e) Certain cases of acute nephritis and of rheumatic fever of recent origin have been reported as benefiting from tonsillectomy, but the value of the operation for such cases is very doubtful.

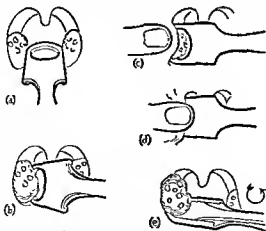


Fig 34.—Enucleation of tonsils.

- (a) Examining the tonsils; (b) inserting the blunt gullotine;
- (c) pressing the tonsil into the window of the gullotine;
- (d) feeling the "dimple"; (e) twisting out—the tour de maltre.

METHODS OF TONSILLECTOMY.—Whatever method is used the tonsils must be removed completely. If a tonsil grows again it has not been properly taken out. There are two methods, enucleation with a blunt guillotine and dissection.

ENUCLEATION.—Enucleation with a blunt guillotine is suitable for most cases of enlarged tonsils in children and adults, and is quickly carried out, so only a short anaesthetic is required, but it is somewhat of a conjuring trick. The late Mr. Rutherford Morison, after successfully performing the operation on the child of wealthy parents, sent in a bill for fifty guineas; the parents demurred, whereat Mr. Morison replied: "I charge five guineas for the operation and forty-five for knowing how to do it".

Anaesthetic.—The usual premedication with morphia gr. $\frac{1}{4}$, hyoscine gr. $\frac{1}{160}$ (adult dose), is given about an hour before operation unless intravenous anaesthesia is to be given. In India, chloroform and ether, ethyl chloride and chloroform, or intravenous Cyclonal are generally used. If ethyl chloride is to be given, insert the mouth gag first because there may be spasm of the jaw. The patient lies on his back, with the head well lowered, or on the right side.

Method.—

- (a) As soon as the jaw is relaxed the patient is ready, so insert the mouth gag, the Davis-Boyle or Doyen's being the best, and open the jaw reasonably widely. Too wide opening may dislocate the jaw, but this is easily reduced. If breathing is obstructed draw the jaw forward.
- (b) Inspect the tonsils (Fig. 34 (a)).
- (c) Taking the right tonsil first (Fig. 34 (b)) insert the ring of the guillotine behind and below it, being careful to include the lingual pole, which can be made more prominent by drawing the tongue forward. The window of the machine is preferably oval in a transverse diameter and the blade *must be as blunt as a butter knife*.
- (d) By means of the ring, press the tonsil firmly forwards and draw it towards the middle line, until the guillotine lies more or less horizontally across the mouth (Fig. 34 (c)).
- (e) With the left thumb press on the anterior pillar of the fauces until a *definite dimple* is felt by the thumb. This indicates that the whole tonsil is inside the ring and that the pillars of the fauces are practically turned inside out, and is the most important part of the operation (Fig. 34 (d)).
- (f) When the dimple is definitely felt, firmly close the blade, hold it tightly closed and keep it motionless for ten seconds; this insures that the vessels are well crushed and prevents bleeding.
- (g) Still keeping the blade tightly closed, pronate the right hand and thus twist the tonsil gently but firmly up into the nasopharynx, the "tour de maître". A little force is sometimes needed to drag the tonsil out of its bed (Fig. 34 (e)).

- (h) Attend to hæmostasis by means of swabs on forceps and then remove the left tonsil, the right hand of course being supinated for the "tour de maitre". If the patient shows signs of coming round, it is best to deal with the left tonsil straight away, a skilled operator being able to do this by feel if the view is obscured by blood.
- (i) Pass the adenoid curette (the writer prefers St. Clair Thomson's) well up into the nasopharynx and tilt the handle towards the patient's head to ensure that the blade is against the posterior wall. Give two clean sweeps, one on either side of the middle line, and remove the instrument with the adenoids clinging to it.
- (j) Take out the gag, turn the patient on his side so that all blood runs out of the mouth, and apply plenty of iced water and swabs to the neck; hæmorrhage is usually slight and ceases in a few minutes.

If recurrent or persistent hæmorrhage occurs, apply a swab soaked in Thrombin, Hæmoplastin, Coagulen Ciba, Stypven, or some similar preparation. If this does not stop the bleeding it is best to anaesthetize the patient, insert a mouth gag, see the bleeding point, apply a hæmostat and if possible ligature it; if this is impossible, leave the hæmostat in place for 48 hours.

Dissection.—This takes longer and is more difficult; it also requires first-class anaesthesia, preferably intratracheal, although it can be done under intravenous anaesthesia. A good head-light is an absolute necessity. For patients above the age of 16, local anaesthesia by Morey's method is the best. Dissection properly done ensures complete removal of both tonsils and is the only method allowed in London County Council schools.

Method.—Dissection in children below the age of 16 is carried out as follows:

- (a) When the patient is properly anaesthetized draw him along the table until his head is right at the end, with a sand-bag supporting the shoulders. Insert the Davis-Boyle gag, which also depresses the tongue, and make certain, by the help of an assistant, or by fixing the special attachment, that the jaw is kept forward, otherwise breathing will be impeded; this also occurs if the tongue depressor is too short.
- (b) Sitting on a stool at the head of the table, examine the tonsils with the head-light.
- (c) If intratracheal anaesthesia is being given, pack off the pharynx.
- (d) Draw the soft palate and uvula forward, under direct vision remove the adenoids if present, and attend to hæmostasis.
- (e) Amputate the uvula.
- (f) With an angled vulsellum forceps draw the right tonsil gently towards the midline.
- (g) With a sharp knife incise the mucous membrane along the

stretched edge of the anterior pillar of the fauces and over the top of the tonsil to the posterior pillar.

- (h) Using a pair of curved, blunt-pointed scissors separate the tonsil from the anterior pillar by blunt dissection, working from above downwards, and complete the separation in the most convenient manner (the writer uses a small swab held in a long pair of dissecting forceps, with which he rubs the tissues off the tonsil).
- (i) When the whole tonsil is free except for the lower pole, clamp the latter with a pair of Kocher's forceps, wait 10–15 seconds and then twist out the lower pole and tonsil complete. Some operators divide the pedicle with a snare, but the writer finds the Kocher's forceps easy and convenient.
- (j) Attend to haemostasis and remove the other tonsil in the same way.

MOREY'S BLOODLESS METHOD.—This method, described in the *British Medical Journal* (25.12.43), differs from the above in the position of the patient, who is operated on sitting up, and in the nature of the anaesthesia, which is local. No mouth-gag is required but a tongue depressor is usually employed. The method is as follows, and premedication is as above (morphia gr. $\frac{1}{4}$, hyoscine gr. $\frac{1}{16}$ an hour before operation).

Local Anaesthesia.—"Two minutes before injection the pharynx is sprayed with a 10% solution of cocaine mixed with an equal amount of adrenaline solution. Five injections, each of 5 c.c. $\frac{1}{2}$ % Novutox are made into each tonsil area." (The writer uses the same quantity of 1:1,000 Aoethaine or Nupercaine with the addition of $\frac{1}{2}$ c.c. of adrenaline solution to each 10 c.c.; $\frac{1}{2}$ % Novocain may be used similarly.) "The first injection is made at the top of the anterior

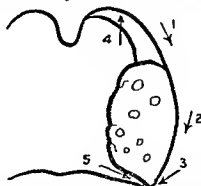


Fig. 35.—Tonsil areas for injecting a local anaesthetic.

pillar with the tip of the needle (which is bent to nearly a right-angle) pointing downwards and slightly outwards. The second is made in the middle of the pillar, 1 cm. from the free border, with the needle pointing directly downwards. The third, and most important, is made at the junction of the anterior pillar and base of the tongue, the needle being pointed downwards and inwards.

For the fourth injection the point of the needle is inserted behind the posterior pillar, as high as possible in an upward direction, the syringe being drawn over into the opposite angle of the mouth. The fifth injection is made behind the posterior pillar as low as possible, the point of the needle being directed downwards and outwards, with the syringe drawn well over into the angle of the mouth (see Fig. 35). When the injection of both tonsils has been completed there will be considerable local swelling due to the injected fluid. The patient should wait for not less than ten minutes before dissection is begun, so that absorption may properly take place".

With Anethaine or Nupercaine a wait of about 15 minutes is usually better.

The operation, except for the position of the patient and the fact that adenoids are not removed, is on the same lines as that described above; the uvula can be amputated, if long.

TREATMENT AFTER TONSILLECTOMY.—The patient is returned to bed, and injections of morphia are given if required, care being taken not to overdose a child. Aspirin by the mouth is also comforting. The mouth should be rinsed out, but gargling is not advised if painful. The patient is allowed up after 24–48 hours, and a purge is given in order to help elimination of anaesthetic and swallowed blood. Ice-cream forms an important and soothing part of the diet and is greatly appreciated by children. If the adenoids have been removed and there is a history of ear trouble, give prophylactic sulphadiazine or penicillin for a few days.

Work may be resumed after 10–14 days.

TORTICOLLIS

CONGENITAL TORTICOLLIS.—The aetiology appears to be similar to that of talipes, and is probably an ante-natal maldevelopment of the sternomastoid muscle, usually on the right side; the face is generally smaller on the affected side.

Treatment is by tenotomy or, better, by lengthening the muscle by means of a Z-shaped incision in its lower half, that is, below the entrance of the spinal accessory nerve.

SPASMODIC TORTICOLLIS.—This is a neurosis sometimes associated with the patient's occupation. It is commonest in middle-aged people.

Treatment is unsatisfactory, but section, or alcohol injections, of the spinal accessory nerve shortly after its exit from the jugular foramen has met with some success. Suggestion therapy, either by hypnosis or under barbiturate anaesthesia (see Hysteria) is a promising method of treatment.

TRACHEA—See Air Passages and Oesophagus, Foreign bodies in.

TRACHEOTOMY—See Larynx.

TRACHOMA—See Eye.

TRANSFUSION—See Blood Transfusion.

TRICHIASIS—See Eye.

TRIGEMINAL NEURALGIA—See Nervous Diseases (Neuralgia).

TROPICAL ULCER—See Ulcers.

TUBERCULOSIS OF THE LUNGS—See Pulmonary Tuberculosis.

TYPHOID—See Enteric Fever.

TYPHUS FEVER

The group is a large one and at least 50 different names have been given to various types at various times.

Megaw, who himself suffered from and then described the first recorded case of tick typhus, classifies the typhus group as follows.

LOUSE TYPHUS (Epidemic Typhus)

Transmission is from man to man by the faeces of the louse, which becomes infective within a week or ten days of biting an infected person. The louse then bites a non-infected person and defaecates close to the bite; the patient-to-be scratches the bite and rubs in infected louse faeces; between 10 and 14 days later the disease develops.

TICK TYPHUS (Rocky Mountain Fever)

Transmission is by a tick infected from a rodent such as the rat, the field-mouse or perhaps the common tree-rat (chipmunk, galeri) (Megaw told the writer that he thought the historic tick which infected him fell from a tree). There is also evidence that ticks transmit the infection to their progeny. "Infection usually enters through the puncture made by the tick in the act of biting, but it can also enter through the conjunctiva when the eyes are rubbed by a finger which has become infected through handling ticks from dogs" (Megaw)

One Sunday evening a friend of the writer's in New Delhi went for a stroll in her garden and was bitten "by some insect" which left quite a noticeable puncture on her leg. On Tuesday evening the writer was asked to see her because she had fever with a rigor; this was the beginning of a typical attack of tick typhus.

FLEA TYPHUS (Murine Typhus, Urban Typhus)

Transmission is from rats by means of rat fleas. The disease is probably much commoner than is generally supposed, and is often found in seaport towns, particularly round the Mediterranean.

MITE TYPHUS (Tsutsugamushi, Scrub Typhus, XK Typhus) is another form of typhus which is probably the cause of many unexplained fevers.

Transmission to man is by mite larvae whose parents have become infected from rats or mice, to which clusters of them cling. The larvae probably feed on human beings for several days, and attach themselves to persons sitting or lying on the ground, or standing with bare feet in an affected area, which is usually close to water.

Q Fever, which occurs among Australian butchers, and *Trench Fever*, which was very common in World War I and was caused by lice, are now included in the typhus group.

Megaw considers that many of the cases of "Fever", lasting for 8 or 10 days without any localizing symptoms, which occur in India, especially during the autumn, are mild attacks of mite typhus.

Brill's Disease, which occurs in the U.S.A., is probably louse typhus, and the *Fièvre Boutonneuse* of the Mediterranean coast is probably tick typhus.

CLINICAL FEATURES.—The typhus group has certain features in common:

Infection is conveyed by a body parasite. Only louse typhus is conveyed from man to man, the other varieties come from rodents or occasionally birds.

The Causative Organism is one of the larger filter-passing viruses belonging to the general group Rickettsia. These are visible under a high-power microscope.

The Incubation Period is usually 10–14 days but may be as short as 48 hours or as long as 24 days.

The Rash comes out about the fourth day, beginning as rose spots and later becoming petechial or purpuric, but there may be no rash in mild cases. In louse and flea typhus the rash seldom appears on the face, palms or soles, but the reverse is true of the other varieties.

The Fever lasts for about 14 days but for only 7 or 8 days in the mild types. Resolution is by crisis or lysis and convalescence is rapid and complete once the temperature has become normal. Many patients after recovery say that they feel "better than they have felt for months".

The Weil-Felix Reaction, that is to say, agglutination of a suspension of *Proteus* OX 19 or OXK bacilli is given by the patient's serum after about the first week, but may be delayed. As with the Widal reaction a "rising titre" must be present for the test to be positive. The complement fixation test is also positive.

Leading Symptoms are fever, headache, mental torpidity, insomnia, with delirium in severe cases, constipation and a skin rash.

Mortality is severest in the louse-borne variety, in which the percentage is roughly the same as the age of the patient, but it varies greatly in different epidemics and different varieties; it is higher in debilitated than in previously healthy persons.

Prophylactic Inoculation is effective, the vaccine being prepared by growing Rickettsiae on embryo chicks. A specific vaccine is required for each variety.

PREVENTION.—The louse-borne type is completely prevented by spraying all clothes and contacts with D.D.T. or Gammexane powder. The other types are best prevented by destruction and avoidance of rodents and their parasites. In the prevention of tick typhus it is important to remember that a starving tick does not transmit the disease; persons in an endemic area should therefore

watch carefully for ticks and remove them before they have had time to have a blood feed.

Dibutyl phthallate, rubbed into the clothes once every two months is one of the best repellents against mite typhus. The effect survives three washings of the clothes.

TREATMENT.—Penicillin in the usual doses is perhaps the most effective remedy and should be given until the temperature has been normal for 24 hours. The writer has had some success with twice-daily intravenous injections of 10 c.c. of 10% hexamine. General treatment is as for any continued fever, delirium and insomnia being treated by barbiturates, headache by aspirin or other analgesic, hyperpyrexia by tepid sponging, and constipation by laxatives. A nurse is essential.

ULCERS

An ulcer has been described as "half an abscess" and the characteristic lesion consists of an area of granulation tissue replacing skin or mucous membrane. Another characteristic of ulcers is their chronicity.

TRAUMATIC ULCER.—This is perhaps the commonest, and may result from a wound, a blow, a burn, or pressure, as in a bedsore.

Treatment.—Cleanliness and rest and the avoidance of repeated washings and dressings, which remove the delicate newly-forming epithelium. Penicillin-sulphonamide Vaseline or Elastoplast is an excellent dressing.

X-RAY ULCER.—This is characterized by its painfulness, its depth and its chronicity, the devitalized tissues taking many months to heal.

Treatment.—Ultra-violet light in well-controlled doses helps healing and the remainder of the treatment is chiefly by rest and the avoidance of infection. Excision and skin grafting is apt to be disappointing because of the diminished healing power of the tissues.

INFECTIVE ULCERS.—These may be due to any of the infective granulomata such as tubercle, yaws, syphilis, actinomycosis, leprosy, glanders, granuloma inguinale, or "tropical" ulcer (*see below*).

TROPHIC ULCERS.—These occur when there is a lesion of the nerve supply of the part, as in the very severe ulcers that are so common after spinal injuries. A sub-variety is the perforating ulcer found in tabes dorsalis, syringomyelia, diabetes and leprosy.

SEPTIC ULCERS.—These may occur in a debilitated patient or in association with dead bone or a foreign body, which may be felt if an apparent ulcer is carefully probed.

VARICOSE ULCERS.—These are common in the lower third of the leg (contrast syphilitic ulcers, which occur in the upper third).

Treatment.—Primarily this is to cure the varicose veins (*q.v.*). Local treatment by the prolonged application of Elastoplast is both simple and efficient. Strong antiseptics must be avoided but the

application of Tyrothricin (*see* Chemotherapy) has had very good results.

An old-fashioned favourite is Unna's paste, which is made as follows:

Dissolve 2 oz. gelatin in 8 oz. of water which is just boiling, then add 1½ oz. glycerin, stir and slowly add 4 oz. of zinc oxide, stirring well and allow to cool. The paste should be warmed before application in order to liquefy it and then painted thickly over the ulcer, after which a light dressing is applied. The dressing should be changed as seldom as possible.

In resistant cases the writer has had considerable success with skin grafting.

MALIGNANT ULCER.—This is a rodent ulcer or an epithelioma.

Treatment is by radium or X-rays and is most satisfactory, but must be given early.

TROPICAL ULCERS.—These are of several kinds, and are not very satisfactorily named.

ORIENTAL SORE due to infection with Leishman-Donovan bodies through the bite of a sand-fly is discussed under Kala-Azar. In India, the writer has more than once seen a rodent ulcer on the face of a middle-aged person wrongly diagnosed as oriental sore.

DESERT OR VELDT SORE is closely associated with a dry country and lack of washing, from which its geographical and social distribution can be readily deduced.

It occurs on exposed surfaces and is due to infection of a small cut or abrasion, the common organisms being the streptococcus and the *C. diphtheriae*; soldiers with cracked hands, washing dishes in warm water, are particularly liable to infect each other. Other organisms such as the staphylococcus, *B. proteus* or *B. pyocyaneus* are probably secondary.

The lesion usually begins as a small painful blister which soon bursts, leaving an indolent, sloughy ulcer which tends to spread, and has a thick overhanging edge. In diphtheritic cases there is a greyish slough, which, as in the throat, leaves a bleeding area when removed.

In the absence of efficient treatment a desert sore lasts for many months.

Treatment.—Whenever possible, a swab should be examined and if there is any suspicion of diphtheria, penicillin should be given in the usual doses and diphtheria antitoxin injected in four doses of 5,000 units each in the neighbourhood of the ulcer; 20,000 units are given intramuscularly or intravenously each day for the next four days. In the first case that came under the writer's notice a Brigadier developed almost complete paralysis of both legs, which a neurologist found was due to peripheral neuritis. The patient volunteered the statement that he had had a troublesome ulcer on his neck for several weeks; anti-diphtheritic serum was given, the ulcer healed rapidly, the paralysis recovered in about six weeks and in about three months the patient returned to duty.

Diphtheritic cases are not, however, so common as was formerly supposed, the streptococcus cases being more usual. In any type of case the ulcer and surrounding skin should be thoroughly cleansed with hydrogen peroxide followed by boric lotion and then dried, after which the following is applied on a piece of sterile gauze secured with Elastoplast.

R. Penicillin	100,000 units
Sulphathiazole	3ss
Proflavine	gr. 1
Cod-Liver Oil to	3ss

The affected area is immobilized, by putting the patient to bed if need be, and the dressing changed once daily to begin with and less often later.

When there is considerable sloughing the writer has found the pulp of slightly unripe *papayas* (paw paws) applied in a layer about $\frac{1}{4}$ -inch thick and covered with sterile gauze to be unrivalled for removing unhealthy sloughs and producing a clean granulating surface.

The patient should also be given a sulphonamide by mouth or penicillin by injection.

General treatment consists in giving good fresh food, vitamins, liver and plenty of salt.

TROPICAL ULCER, unlike desert sore, is found in hot humid areas such as the plains of Assam and Burma, where it became almost epidemic during World War II.

The usual infecting organism is a fusiform bacillus of the Vincent type, generally associated with a spirochaete, but many other organisms have also been found.

The legs and feet are most commonly affected and the danger of the ulcer, apart from its chronicity, is the depth to which it may penetrate.

Treatment.—The best method is to dust on penicillin powder three times a day after the ulcer has been cleaned up, and to give penicillin intramuscularly in the usual doses, or the cod-liver oil preparation referred to above may be applied; under either method the ulcer heals rapidly.

Alternative methods are to apply a sulphonamide ointment locally and give a sulphonamide by the mouth, or to bathe the ulcer four times a day with 1:5,000 permanganate of potash or 1:1,000 perchloride of mercury.

Complete excision of the ulcer with immediate skin grafting has been advocated by many, but in the writer's opinion it is better to give penicillin a chance first.

In the writer's hands treatment as for oriental sore, namely, by complete excision with a *sharp spoon*, has proved successful; after the little operation the cod-liver oil preparation mentioned above should be applied, or gentian violet cream (1% in mucilage of tragacanth) or copper sulphate ointment (0.5% in Vaseline) may be used instead.

General treatment is as for desert sore, and it was the writer's impression during the Assam-Burma campaign that the taking of mixed vitamins had a very definite preventative and curative value. Calcium injections (e.g., 10 c.c. of calcium gluconate) are also recommended.

ULCER, CORNEAL—See Eye.

ULCER, DUODENAL—See Gastric and Duodenal Ulcer.

ULCER, GASTRIC—See Gastric and Duodenal Ulcer.

ULCER OF TONGUE—See Tongue, Diseases of.

UNDESCENDED TESTICLE—See Testicle, Undescended.

UNDULANT FEVER—See Malaria Fever.

URAEMIA (See also Urine, Retention, Extravasation and Suppression.)

The so-called uraemia of *acute nephritis* resembles the condition known as hypertensive encephalopathy in that it is probably due to transient oedema of the brain.

The *symptoms* are severe headache, visual disturbances, convulsions, and sometimes coma.

Treatment is to dehydrate the brain. This is best done by giving intravenously 20 c.c. of a 10% solution of magnesium sulphate. Alternatively, half a pint of 30% mag. sulph. may be given by slow rectal drip. Intravenous injection of 100 c.c. of 50% glucose or sugar solution is another method, but this is more difficult to arrange in an emergency unless special flasks of the fluid are kept; it is also apt to be followed by thrombosis of the vein. A more modern method of treatment is to give 250–500 c.c. of blood plasma by the vein. This is also said to be effective in the cerebral oedema accompanying encephalitis.

Lumbar puncture is not recommended because a sudden release of pressure may cause the medulla to "crowd" into the foramen magnum, which it may be already trying to do. If lumbar puncture is done, not more than 30 drops of fluid must be allowed to escape per minute, and not more than 30 c.c. in all. Cisternal puncture is without this danger. For method, see Cisternal Puncture.

The uraemia occurring in the terminal stages of *chronic nephritis*, or chronic urinary obstruction, is a much more serious condition.

The *symptoms* are headache, vomiting, diarrhoea and odd twitchings and cramps. The smell of the breath and the dry yellow or brown tongue clinch the diagnosis. When coma supervenes it is generally fatal. Blood-pressure is high, often over 250 mm. Hg.

Treatment.—Blood letting, salines, sedatives, heart stimulants, calcium and the like may cause temporary improvement in the symptoms, but nothing can restore the destroyed kidneys, and death supervenes after hours, days or weeks.

URETER, CALCULUS OF—See Calculi.

URETHRA, RUPTURE OF

In a case of ruptured urethra following a blow or fall on the perineum, there is pain and a desire, but inability, to pass urine, with haemorrhage from the meatus. The patient must be prevented from making any attempt at micturition. A catheter is passed gently along the roof of the urethra; if it enters the bladder the urine is drawn off and it is tied in. If it does not pass it is left in position, and the patient is anaesthetized and placed in the lithotomy position, the haematoma incised, the clot turned out, and haemorrhage stopped. In partial rupture the edges are sutured with catgut over a catheter. In complete rupture the visceral end may be difficult to find, so suprapubic cystotomy may have to be performed and the end identified by retrograde catheterization.

URETHRAL STRICTURE—See Urine, Retention, Extravasation and Suppression.

URETHRITIS—See Venereal Diseases—the special article on Gonorrhoea.

URIC ACID GRAVEL—See Gravel.

URINE, RETENTION, EXTRAVASATION AND SUPPRESSION

RETENTION OF URINE.—In old men the common cause is enlarged prostate and in younger men, stricture; these two account for about 90% of cases. Acute retention is likely to occur if the bladder is allowed to overfill or the patient to overdrink; these two conditions must, therefore, be very carefully avoided by persons with enlarged prostate or stricture.

Next to the above, the commonest local causes are impacted stone, injury to the urethra, and acute urethritis.

Other local causes are string round the penis, tight phimosis, and acute prostatitis in males, and retroverted gravid uterus or pelvic growths in females.

Certain affections of the nervous system may cause acute retention, by far the commonest being, of course, spinal injury or transverse myelitis; tabes dorsalis may be accompanied by retention because the patient does not know his bladder is full, and disseminated sclerosis because the sphincter will not relax. (In his young days the writer wished to admit a case of the latter to hospital for removal of an "ovarian cyst", but fortunately a wise old colleague said "Pass a catheter.")

Post-operative retention, especially after operation for hernia or piles, must always be watched for, and may be due simply to the fact that the patient cannot urinate lying down. The remedy is to let him sit up or stand up, and to send the nurse out of the room. If this fails, the bladder may be helped by intramuscular injections of Prostigmin, carbachol (Doryl), Pituitrin, acetylcholine or ephedrine. Sometimes the patient will do better after morphia (gr. $\frac{1}{4}$) and atropine (gr. $\frac{1}{16}$), but often it is necessary to pass a

catheter, which should be done once or twice daily; a drachm of glycerin left in the bladder sometimes brings success at the next attempt. Done aseptically, catheterization is quite harmless and seldom has to be continued for more than a few days; sulphonamides may be given to guard against urinary infection. Post-partum retention must be watched for after a difficult labour.

After a spinal anaesthetic, especially a concentrated heavy low one, retention may be very troublesome and may last for several weeks; treatment is by acetylcholine, vitamin B and catheterization; the ultimate prognosis is good.

Finally, hysterical patients may be "quite unable to pass water"; treatment is by disciplinary psychotherapy.

TREATMENT OF ACUTE RETENTION DUE TO ENLARGED PROSTATE OR STRICTURE.—If the time-honoured morphia and hot bath treatment fails it will be necessary to pass a catheter, and if that fails, to drain the bladder suprapubically. *In a long-standing case, with a large hypertrophied bladder the urine must be drawn off slowly or the patient may develop uraemia and die.*

In a case with enlarged prostate after thoroughly sterilizing the patient's glans, try with a fair-sized, well-lubricated (liquid paraffin is better than glycerin) rubber catheter. Coudé and bicoudé gum-elastic catheters are seldom obtainable in India, so if the rubber catheter will not go in, the writer uses an ordinary metal calculus-evacuating catheter of medium size, which with a certain amount of delicacy and manipulation, sometimes helped by a finger in the rectum, can be persuaded to pass the prostatic excrescence, which it must be remembered lies on the floor of the urethra.

When the catheter is in, it should be tied in and a piece of gauze well powdered with sulphathiazole-flavine wrapped round the glans and catheter. If the case is one of chronic retention with overflow the catheter is now closed, to prevent escape of urine, and connected to a drainage apparatus. Hamilton Bailey advises connecting the catheter to a rubber tube and saline drip controller, with the pinch cock adjusted so that one drop of urine escapes per second. In severe cases he recommends the simultaneous intravenous injection of sod. sulph. solution (the writer has found 10 c.c. of a 20% solution, given slowly, very satisfactory). (For further treatment, see Prostate.)

In a case of stricture, first instil a local anaesthetic with adrenaline into the urethra and allow it to act for 15 minutes before attempting any catheterization, the patient lying on his back. About 4 c.c. of a 3% solution of cocaine, a 6% solution of Novocain or Planocaine or, better, 1% Anethaine or Pantocaine, with 1 c.c. of Liq. Adrenal. Hydrochlor. are injected and a penis clip applied or the patient told to compress the meatus with his finger and thumb. After 15 minutes the solution is allowed to escape, and 5 c.c. of sterile liquid paraffin injected similarly. (A 5 c.c. Record syringe applied firmly to the glans, with the nozzle to the meatus does very well; the needle is not attached.)

Now take a well-lubricated Nn. 4 size gum-elastic catheter and try to pass it; if it will not pass, try a Nn. 3, No. 2 and No. 1 in turn. If, as often happens in India, gum-elastic catheters are not available, try the smallest size metal evacuating catheter. If this fails, try an ordinary one, but Nos. 1 and 2 metal are dangerously able to make a false passage. If gentle manipulation has failed and if gum-elastic filiform bougies are available, pass one as far as it will go, then another, then another and so on until ultimately one goes through, when it will be found that the urine begins to leak out. If it leaks out satisfactorily, leave the bougie in for a couple of days and then try a small (preferably gum-elastic) catheter; after 24 hours try a larger one, and so on, the ultimate object being to dilate the stricture to a physiological size (12-14 size catheter).

If a catheter cannot be passed, suprapubic drainage is necessary, for three reasons: the bladder must be drained; if the obstruction is due to the prostate, suprapubic drainage is a necessary preliminary to prostatectomy; and if it is due to stricture it is equally necessary before urethrotomy in order to give the wound a chance to heal cleanly.

SUPRAPUBIC DRAINAGE.—Again in long-standing cases with overflow incontinence the urine must be allowed to escape drop by drop, and to plunge a knife into the bladder and let the urine fountain out is a criminal procedure.

In emergency, a long hypodermic or a lumbar puncture needle can be thrust into the bladder just above the pubic bone, in a backward and downward direction so as to be well below the peritoneum.

For more permanent drainage, Hamilton Bailey's method is probably the best. Under local anaesthesia he makes an incision down to the bladder, pushes the peritoneum and extraperitoneal fat (easily identified when present) upwards off the bladder and freely powders the raw area with a sulpha-flavine powder. He then inserts the blade of a fine scalpel through the tip of a de Pezzer catheter, which thus rests on the shoulder of the knife; he now stretches the catheter so that the self-retaining head is drawn out straight, and thrusts the knife, which takes the catheter with it, into the distended bladder. The knife is withdrawn, the tip of the self-retaining catheter opens out and remains in the bladder. A better method, instead of the scalpel, is to use his bladder perforator, an instrument which should be in every large hospital, but is not always to be found in a small one, although it is a good investment for any hospital or dispensary.

The tip of the catheter is pressed well into the bladder to prevent its escaping when the bladder contracts, and the catheter secured by a stitch. The sulpha-flavine powdered wound is sewn up and the urine allowed to drain away slowly as already described.

After two or three weeks, if the patient's condition is good and his blood-urea below or about 50 mg. per 100 c.c. the prostate may be removed or the stricture operated on.

If a self-retaining catheter is to be used as a permanency it must

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SUPRAPUBIC DRAINAGE.—Again in long-standing cases with overflow incontinence the urine must be allowed to escape drop by drop, and to plunge a knife into the bladder and let the urine fountain out is a criminal procedure.

In emergency, a long hypodermic or a lumbar puncture needle can be thrust into the bladder just above the pubic bone, in a backward and downward direction so as to be well below the peritoneum.

For more permanent drainage, Hamilton Bailey's method is probably the best. Under local anaesthesia he makes an incision down to the bladder, pushes the peritoneum and extraperitoneal fat (easily identified when present) upwards off the bladder and freely powders the raw area with a sulpha-flavine powder. He then inserts the blade of a fine scalpel through the tip of a *de Pezzer* catheter, which thus rests on the shoulder of the knife; he now stretches the catheter so that the self-retaining head is drawn out straight, and thrusts the knife, which takes the catheter with it, into the distended bladder. The knife is withdrawn, the tip of the self-retaining catheter opens out and remains in the bladder. A better method, instead of the scalpel, is to use his *bladder perforator*, an instrument which should be in every large hospital, but is not always to be found in a small one, although it is a good investment for any hospital or dispensary.

The tip of the catheter is pressed well into the bladder to prevent its escaping when the bladder contracts, and the catheter secured by a stitch. The sulpha-flavine powdered wound is sewn up and the urine allowed to drain away slowly as already described.

After two or three weeks, if the patient's condition is good and his blood-urea below or about 50 mg. per 100 c.c. the prostate may be removed or the stricture operated on.

If a self-retaining catheter is to be used as a permanency it must

be changed at least every two months or it becomes so coated with phosphatic concretions that it cannot be removed.

RETENTION DUE TO IMPACTED STONE.—If in the penile urethra this may be extracted or crushed with urethral forceps or removed through a small incision; if it is in the scaphoid fossa at the tip of the penis the orifice may be stretched or incised and the stone removed.

Stone in the prostatic urethra is usually so firmly impacted that suprapubic lithotomy is necessary. In a few of the writer's cases it has been possible, by means of a closed lithotrite, to push it back into the bladder and then crush it, but often the stone is of an hour-glass shape with the neck of the bladder holding it firmly. The treatment is then to open the bladder suprapubically, break off and remove the intravesical portion of stone, dilate the neck of the bladder and extract the impacted portion with lithotomy forceps.

In cases of *injury* to the urethra, the bladder is opened suprapubically, the injury repaired if the tissues are healthy—otherwise it is better to wait—and a catheter passed through the urethra.

If retention is due to *acute urethritis* on no account try to pass a catheter, but drain the bladder suprapubically and give vigorous chemotherapy.

In *acute prostatitis* open the abscess if it is pointing, otherwise pass a rubber catheter and give chemotherapy.

In *retroverted gravid uterus*, first empty the bladder by means of a catheter, then, with the patient in the knee-elbow position, try to antevert the uterus by means of a finger in the rectum. Judiciously used, a sigmoidoscope may be employed to press the pregnant uterus forward. An anaesthetic may be necessary.

In case of *spinal injury or transverse myelitis* it is now generally agreed that suprapubic drainage by Hamilton Bailey's method (*see above*) is the best and safest treatment.

EXTRAVASATION OF URINE.—This may follow rupture of the neck of the bladder or of the urethra after attempted catheterization. The urine escapes between the triangular ligament and the deep (Colles's) fascia, which are united behind, attached to the pubic arch and at the sides, and open in front, so the urine passes forwards on to the genitals and abdominal wall.

TREATMENT.—Free incisions are made through the swollen structures and the bladder drained through an external urethrotomy or a suprapubic opening, preferably with a suction apparatus. Chemotherapy is also essential. Repairs are effected later, after inflammation has subsided.

SUPPRESSION OF URINE (*see also Retention*).—In this condition no urine enters the bladder; if the onset is gradual and due to nephritis or heart failure, death will occur within two or three days if the condition is not relieved. If the onset is sudden, as in reflex or obstructive cases, the patient may remain apparently well for ten or more days, during which time much can be done, but no time must be wasted.

Non-Obstructive Anuria.—In acute nephritis and in eclampsia suppression occasionally occurs.

Certain *poisons* such as perchloride of mercury, turpentine, carbolic acid or cantbarides, or the toxic metabolites excreted after a severe crushing accident (Crush Syndrome) by causing an acute irritative tubulo-glomerular nephritis cause suppression of urine; the writer has seen the same condition in a fatal case when a young woman swallowed a boxful of "Meta fuel" (metaldehyde).

Fevers and severe sweating may cause temporary anuria which clears up, as does the anuria of cholera, shock or heart failure if the patient recovers.

The interesting condition of reflex anuria is occasionally seen in a healthy kidney after the other has been removed or after a stone has been taken out. The anuria that sometimes occurs after rapid emptying of a chronically distended bladder (*see Retention*) is probably of the same nature.

A crushing or blast injury may so damage both kidneys that neither will function.

Anuria due to removal of the only or the only functioning kidney should never occur, especially in these days of pyelography. The tragedy is dealt with under Calculi.

Hysterical anuria, in the writer's opinion, does not occur, as will be shown if the patient is carefully and continuously watched or her room carefully examined; as a wise physician once remarked, "smell the wash basin".

Obstructive Anuria (*see also Calculi*) occurs when each renal pelvis is blocked by a calculus or when the pelvis of the only functioning kidney is blocked in the same way; reflex anuria has been referred to.

Growths may obstruct the ureters; they have also been tied during hysterectomy. Severe pyelitis or tuberculous debris may block the ureters, or aberrant renal arteries may kink them. After large doses of sulphonamides, particularly sulphathiazole or sulphapyridine, given without adequate fluid or alkalies, the renal tubules or even the renal pelvis may become blocked, but such cases are rare nowadays because every doctor knows—or should know—the danger. In *blackwater fever* or after the transfusion of *incompatible blood* the renal tubules may become blocked by crystals of acid haematin.

TREATMENT.—

NON-OBSTRUCTIVE CASES.—The famous Colonel Henry Smith of Jullundur successfully treated cases of suppression of urine in eclampsia by decapsulating both kidneys, a method which should be more widely used when there is reason to believe that, as in nephritis or poisoning, the kidneys are tensely congested and, equally important, that the patient will survive the operation; the method has also been used when the tubules have been obstructed by haematin. It must be done early.

Considering the depth at which the kidneys lie, the application

of hot cupping, poultices, etc., would seem to be useless but harmless; as sweating does not get rid of nitrogenous bodies it is in the same category.

In cases of heart failure or very low blood-pressure, the cause should be treated, intravenous Digoxin or strophanthin—with or without venesection (*vide* Heart Disease (Congestive Heart Failure))—being the remedy in the former case and Cortin or some such preparation in the latter.

N.B.—The blood-pressure should always be taken in cases of anuria.

Of the general methods of re-starting renal activity the best is probably intravenous sodium sulphate; intravenous glucose has a similar but less powerful effect.

Sodium Sulphate method.—About a pint of 4.28% sodium sulphate is given slowly into the vein (6½ drachms of the crystalline substance, or half that weight of exsiccated sod. sulphate to the pint of pyrogen-free water; the solution may also be bought made up in bottles ready for use); 5% glucose can be used similarly. The injection may be repeated after 24 hours if necessary, but not sooner.

Sometimes if the bladder is filled with warm water, the kidneys will take the hint and begin secreting, so this device should always be tried. The best time to do it is when the diagnostic catheter is passed at the beginning.

Everyone with an interest in physiology must have noticed how freely his kidneys secrete after a good action of the bowels, therefore administer a drachm of Pulv. Jalapae Co. or gave a saline enema of about two pints.

Diuretics are on the whole considered dangerous for starting the flow of urine, but can be safely given to maintain it; digitalis, caffeine citrate or a mercurial diuretic such as mersalyl may be prescribed once secretion has begun.

OBSTRUCTIVE CASES.—If the obstruction can be localized it should be removed or relieved. X-rays, unfortunately, cannot be helped by intravenous pycelography because if the kidney is not secreting not only will there be no shadow but there will be danger to both patient and kidneys.

If the requisite instruments and knowledge are available, however, *retrograde pycelography* is of the greatest value; even the passage of a ureteric catheter may start the flow, in which case it should be left in position for 24 hours; it is also useful in cases due to sulphonamides because the pelvis of the kidneys can be washed out.

As a last resort in obstructive cases bilateral pycelostomy may be done and the urine allowed to escape through the wounds in the back.

General treatment on the lines advocated for non-obstructive cases is also carried out.

URTICARIA

The condition may be due to:

- (1) **EXTERNAL IRRITANTS.**—Such as hair lotion or parasites.

- (2) **GASTRO-INTESTINAL IRRITANTS.**—Almost any article may be the cause in those who have an idiosyncrasy. The common causes are fish, especially shell-fish, eggs, acid wines, and fruit, especially strawberries.

(3) **A GOUTY CONSTITUTION.**

TREATMENT.—

Give a saline purge, and, whenever possible, remove the cause. Injections of adrenaline in oil give prompt relief and are repeated 8-hourly if necessary, but do not give them if the blood-pressure is high. Other remedies are:

Benadryl (P.D. & Co.); one capsule by mouth t.d.s.

Hapamine (Lertigon) (P.D. & Co.), as recommended in the directions.

Injections of calcium gluconate with vitamin K.

Calcium lactate, gr. 30–60 by mouth t.d.s.

Local Applications. Calamine lotion, 10% Milton, weak ammonia, 1:40 carbolic lotion, or *Lotio Plumbi cum Opio* are all useful.

In chronic cases examine for eosinophilia and intestinal parasites and do skin tests against antigens.

UTERUS—See *Gynaecology and Obstetrics*.

VACCINATION—See *Smallpox*.

VACCINE THERAPY—See *Specific Therapy*.

VAGINISMUS—See *Gynaecology (Dyspareunia)*.

VARICELLA—See *Chicken-pox*.

VARICOCELE

The treatment is palliative, injection, or by operation. Palliative treatment consists in wearing a suspender of which the best is Keetley's. Injection treatment is still *sub judice*, but successes have been reported with sodium salicylate in the anterior type. Operation should only be done in large varicoceles which cause pain and discomfort. The veins are exposed just below the external abdominal ring, the anterior group of veins is isolated and an inch is removed, the ends being looped up to each other. The posterior group of veins is not touched.

VARICOSE ULCER—See *Ulcers*.

VARICOSE VEINS

Slight and moderate degrees respond well to injection, which can always be repeated, but widespread varicosity generally requires operation.

INJECTION METHODS.—The following preparations are all satisfactory and most of them have been used by the writer at one time or another; 5% *ethanolamine oleate* or *morrhuate* (*Ethamolin* or *Moramin*), is on the whole the best solution; it is

non-irritating to the outside tissues, non-toxic and can generally be relied on to produce a good firm clot.

Sodium Morrhuate (5% for small veins, 10% for large), e.g., Varicane (May & Baker) can be used.

Quinine-Urethane (Quinine bihydrochlor. or hydrochlor. 13½%, Urethane, 6½% in water). The writer used this for many years and found it very satisfactory. Parke, Davis & Co. put it up in convenient ampoules.

Sodium Salicylate 30%; this is apt to be painful and uncertain.

TECHNIQUE.—A good method of injecting a vein is as follows:

- (a) With the patient standing up, apply a "venous tourniquet" above the knee.
- (b) With iodine or mercurochrome mark the lower and upper limits of the vein it is desired to sclerose.
- (c) Put the patient on the table.
- (d) Insert needle at the low point marked with iodine and confirm that it is in the vein by withdrawing blood.
- (e) Remove tourniquet and raise leg to 45° taking care to keep needle in vein.
- (f) Wait a few seconds for the vein to empty.
- (g) Instruct assistant to press on the vein with his thumb at the upper limit already marked.
- (h) Inject 2-5 c.c. of sclerosing agent, withdraw needle and press sterile swab on puncture.
- (i) Wait two minutes for the sclerosing agent to act on the vein it now fills.
- (j) Remove swab and instruct assistant to remove his thumb.
- (k) Apply a small dressing to puncture and keep patient's leg elevated on pillows for 20 minutes.
- (l) Allow the patient to get up and go home.

Sometimes it is difficult to be sure that the needle is in the vein when it is collapsed, or to keep the vein dilated while the patient gets on the table. In such a case the needle should be put in with the patient standing up. If the injection is made with the patient in this position, by the "full vein" method, it is made into the upper end of the varicosity, because the blood in varicose veins flows from above downwards when the patient is standing. It is as well to ask the patient if he (or she) minds injections (do not mention the word "faint") and to let him hold on to something (not the chandelier because he may pull it out of the ceiling, as once happened in a Harley Street consulting room).

Of recent years a good deal of research has been done on varicose veins and there is rather a swing-back to operative methods, particularly high ligation of the internal saphenous and all its tributaries at the saphenous opening, as advocated by Rowlands and practised by the writer over 20 years ago. Advantage is taken of the exposure to inject into the distal part of the vein about 20 c.c. of 30% saline, which produces a long and firm clot. Another ligature may be similarly placed above the knee and the vein below similarly injected.

The method is recommended for severe or resistant cases, but is rather one for the specialist. Various other methods are used by other surgeons.

VARIOLA—See Smallpox.

VENEREAL DISEASES

As with many other diseases, chemotherapy has greatly changed both the treatment and the prognosis, penicillin being of particular value in both gonorrhoea and syphilis. As will be seen in a moment, a much smaller dose of penicillin is required to cure gonorrhoea than to cure syphilis, and herein lies a great danger, because, as pointed out by J. R. Heller Jr., Medical Director in Chief, Venereal Disease Division, U.S. Public Health Service, "The total dosage of penicillin for gonorrhoea is sufficient to delay or abolish completely the development of a chancre without checking the development of the *Treponema pallidum* in the host. Treatment for gonorrhoea may, therefore, mask developing signs and symptoms of syphilis, leaving the patient with a false sense of security, an unwitting victim of the spirochaete.

"There are no data from which it may be learned how often dual infections of gonorrhoea and syphilis are acquired from one or more exposures within a short time. But during one year 9% (nine per cent) of the total admissions to the rapid treatment centres consisted of patients with both syphilis and gonorrhoea.

"It is, therefore, strongly urged that the private physician treating gonorrhoea includes, along with the physical examination, a serological blood test for syphilis at the beginning of treatment and at the end of the first, second and third months."

A further point about penicillin is that it contains various fractions with differing therapeutic values, especially against syphilis, the fractions being known as "G", "X", "F" and "K". In 1944-46 the therapeutic activity of certain batches of penicillin was very disappointing; this was ultimately traced to the preponderance in them of the "K" fraction and has now been rectified.

GONORRHOEA.—

PENICILLIN TREATMENT.—The "Three-hour Schedule" produces a cure in more than 95% of cases, and it has been found that some of the cases of urethritis which were not cured were not due to the gonococcus. The method is as follows:

At 0, 1 and 2 hours give 40,000 units of penicillin intramuscularly, each dose dissolved in 1.2 c.c. distilled water.

At 3 hours give 80,000 units dissolved in 2.4 c.c. of distilled water.

Patients should be examined and swabs taken one week after treatment, and if there are symptoms or signs a double dose should be given. Other methods are also used, and the writer has had success with the "Single Shot" (of 200,000 units of penicillin in 2 c.c. of water) but the three-hour schedule has been tried out on a

large scale in the United States and has been found the most successful. These new short-treatment methods are apparently just as efficacious as the older 3-hourly dosage method carried out for 48 hours.

In tropical countries care must be taken that the penicillin is active, and if the results are disappointing the cause is probably that the penicillin has not been kept at 0° centigrade.

Once again the reader is reminded that he must be on the look-out for artificially suppressed syphilis.

Sulphonamide Treatment.—The most effective sulphonamides are sulphathiazole and sulphadiazine, the dosage being as follows:

Initial dose 2 grammes (4 tablets) followed every three hours by 1 gramme (2 tablets); these are usually given at 12, 3, 6 and 9 o'clock, and after the first three days, the 3 p.m. dose may be omitted. The patient must be given plenty of fluids, in order to prevent crystallization in the tubules; he is kept in hospital, and treatment is kept up for a week, at the end of which about 75% of cases should be cured. A blood count is then done to eliminate leucopenia. Unfortunately, owing probably to insufficient dosage, and perhaps to the fact that gonococci, like the rest of creation, believe in struggling for their existence, several strains of sulphonamide-resisting gonococci have appeared and seem to be particularly common in women, sailors and Italians.

Penicillin-resistant gonococci also exist, but can generally be overcome by increased and prolonged dosage of the drug.

Nowadays, *irrigation* is rarely required, but when it is, potassium permanganate 1:8,000 remains the best remedy. Adjuvants such as vaccines may help in certain cases, particularly the intradermal Gonoderm of Parke Davis & Co.

SYPHILIS.—

EARLY CASES.—The earlier treatment is begun, the earlier and more permanent will be the cure.

It is of the first importance to examine scrapings from any suspicious sore; they are best examined by dark-ground illumination, but staining methods are quite successful; for details, see Laboratory Methods.

PENICILLIN-ARSENIC-BISMUTH METHOD.—This short treatment yields a high rate of cures in early cases. It is carried out as follows:

Penicillin.—Give 25,000 units every three hours intramuscularly in 1 c.c. distilled water for 10 days.

Arsenic.—Give 0.03 gramme Mapharside intravenously every day for 10 days. (Patients weighing less than 100 lb. are given 0.02 gramme and those weighing more than 200 lb. are given 0.04 gramme.)

Bismuth.—Give an intramuscular injection of 2 c.c. 10% bismuth salicylate in oil on the 1st, 5th and 10th days.

PLAIN PENICILLIN METHOD.—40,000 units are given every three hours for 10 days without any adjuvants, but the ultimate results are not quite so good as those of the triple method. If there is

albuminuria or any other sign of impaired kidney function, or if there is severe pyorrhoea the plain penicillin method is the best.

INTENSIVE ARSENOTHERAPY.—For early primary cases this has been largely replaced by the above methods because of their greater safety. The mortality of the "5-day intravenous arsenic drip" method was found to be 1:149 and of the multiple arsenic injection method 1:1,873 cases (J. R. Heller).

In cases of secondary syphilis, however, the 5-day intravenous drip method yields about 80% of cures compared with 60% by the penicillin methods. In pregnant syphilitics the 5-day drip method yields a high proportion of healthy babies.

The daily dose of Mapharside is between 1.5 and 3 milligrams per pound of body-weight. Thus, an average dose for a patient weighing 100 pounds would be 210 milligrams, or the contents of seven 0.03 gramme tubes per day. It will be seen at once that the method can be carried out only in hospital, with continuous expert supervision.

Three-Weeks' Plan.—Another rapid method for early cases is to give 0.03 gramme Mapharside daily for one week, 0.04 gramme daily for the next week, and 0.05 gramme daily for the third week. These are average doses for a person weighing 120 lb.

Every other day an injection of 2 c.c. 10% bismuth in oil is given.

By the "Eagle 12-weeks' Plan" Mapharside is given 3 times and bismuth once weekly.

On the 26-weeks' treatment Mapharside is given twice a week for 10 weeks, omitted for 6 weeks and then repeated for 10 weeks. Bismuth is given once a week for three periods of 6 weeks, at the beginning, the middle and the end of the course.

BLOOD TESTS.—With all these rapid methods the blood should be tested at the beginning of the course and again at 2, 4, 6, 9, 12, 18 and 24 months. At the 12th and 24th month examinations, the cerebrospinal fluid should also be tested. If the tests are negative for two years the patient is cured.

In India, where patients are apt to discontinue treatment as soon as they think they are better, the short intensive penicillin methods are recommended.

TERTIARY SYPHILIS.—If the nervous, vascular or renal system is affected it is dangerous to begin treatment with intensive arsenic-bismuth therapy. Give a 10-days' course of penicillin injections as described above under Plain Penicillin and then give the following mixture 3 times a day for a month:

R Pot. Iod.	..	..	..	gr. 15'
Liquor. Hydrarg. Perchlor.	..	..	..	5j
Aq Mentb. Pip. ad	..	..	..	5j

At the same time a bismuth injection (2 c.c. 10%) is given once a week.

If the nervous, vascular or renal system is unaffected begin as from Second Month below, but in all cases give, if possible, a course of penicillin to begin with.

Second Month.—Give Mapharside 0.06 gramme once a week, and a bismuth injection three days after each.

Third and Fourth Months.—Give Mapharside once a week and Pot. Iod. gr. 15-30 by mouth three times a day.

Thereafter give Mapharside weekly for a period of two months, alternating with bismuth weekly and Pot. Iod. as above for a period of two months.

The course of treatment lasts for two years.

The teeth must be watched for pyorrhoea and signs of heavy-metal poisoning and the blood should be tested every three months during the course, and afterwards test both blood and cerebrospinal fluid once a year.

In late cases it is not always possible to keep the blood consistently negative, but symptoms can be cured unless organic damage has been done, and further symptoms can be prevented.

After the course of treatment the blood should be tested at three-monthly intervals in the first year, six-monthly in the second year and thereafter both blood and cerebrospinal fluid should be tested once a year.

A switch from negative to positive blood test is an indication for a fresh course of treatment, but in some cases it may be very difficult to keep the reaction negative.

In the long-course treatment the weekly dose of Mapharside is calculated on the basis of 1 milligram per kilogram of body-weight, which is 10 milligrams per 25 pounds, and the total amount given in a complete course varies from 1.2-2.4 grammes, according to the weight of the patient.

In infants, the initial dose should be calculated on the basis of 0.5 milligram per kilo, and worked up to 1 milligram after a few weeks, but penicillin is probably the method of choice.

OTHER ARSENICALS.—Because of its effectiveness and relatively low toxicity in therapeutic doses, Mapharside (oxyphenarsine hydrochloride) is to be preferred to the older compounds such as neoarsphenamine, the dose of which is ten times that of the newer drug. Although the neoarsphenamine group of drugs are used for intensive therapy this is not without risk and must be carried out in a hospital under expert supervision.

TYPICAL NEOARSPHENAMINE COURSE FOR A PATIENT OF 120 POUNDS

Week	Neoarsphenamine	Bismuth
0	0.45 gramme	0.2 gramme
1	0.45 "	0.2 "
2	0.6 "	0.2 "
3	0.6 "	0.2 " weekly
4-9	0.6 " weekly	Stop bismuth
10-17	Stop arsenic	0.2 gramme weekly

Repeat the whole course twice; this takes a year. If the blood remains or becomes positive, repeat for another year.

NEURO-SYPHILIS.—Tabes is best treated by a combination of penicillin with bismuth and cautious administration of an arsenical compound. G.P.I. is similarly treated, with the addition of malaria or artificial pyrexia (*see Mental Diseases*).

TO SUM UP.—The earlier the treatment of syphilis is begun, the better, hence the importance of taking scrapings from sores because it may make it possible to begin treatment before the blood has become positive.

Early cases are best treated by intensive, and late cases by prolonged therapy, but all cases benefit from penicillin.

SOFT SORE (chancroid) is caused by the Ducrey bacillus and quickly clears up under sulphonamide and Dmelcos-vaccine therapy. Sulphathiazole is given in the usual doses of two tablets four times a day for 8–10 days, and the Dmelcos vaccine, if required, is given intravenously. Penicillin is ineffective in this disease.

LYMPHOGRANULOMA INGUINALE, or tropical bubo, is important because of the serious after-effects that sometimes follow it, especially in females, in whom stricture of the rectum and generalized genital ulceration may occur; in males the results are less serious, usually being confined to the inguinal lymphatic glands unless the patient is a sodomite, when he may get stricture of the rectum.

The disease is commonest in hot, damp seaports, such as Rangoon, Singapore, Calcutta and Bombay, but also occurs elsewhere.

The causative organism is a filterable virus about 150 micro μ in diameter and visible in the leucocytes when stained with Giemsa.

The incubation period is between a few days and three weeks, and the initial lesion is a small ulcer, generally found in the coronal sulcus in males or on the posterior vaginal wall in females. The ulcer lasts only a few days.

DIAGNOSIS.—Apart from the history and clinical appearances, the Frei test is of value and is carried out as follows:

- (a) With a fine hypodermic needle withdraw some "juice" from the infected gland of an otherwise healthy patient.
- (b) Dilute with five times its volume of normal saline and incubate at 60° C. (140° F.) for two hours on one day and one hour on the next.
- (c) Test for sterility.
- (d) Inject 0.1 c.c. intradermally and examine skin after 48 hours. A positive result is a mauve-coloured, raised, hard area about half to one inch in diameter. A control injection should be made nearby with normal saline.

Ready-made antigen for the above test is obtainable under the name of Lygranum; it is made on embryo chicks in the same way as yellow-fever vaccine.

TREATMENT.—The sooner this is begun the better.

Sulphonamides.—Sulphapyridine and sulphanilamide have been

Laboratory by *letter-post*. Registered or unregistered *parcels* take longer to be delivered.

N.B.—The sterile tubes and pipettes required for this purpose can be obtained on application, free of charge, from the Director, Bombay Bacteriological Laboratory, Parel, and should in all cases be returned when no longer required. The pipettes are sent out sterilized. As an additional precaution, they should be passed several times through the flame of a spirit lamp, and allowed to cool completely, before introducing them into the blood or serum.

SOFT SORE

This is due to Duerey's bacillus and is not syphilitic. Collection of material and examination should be made as for primary chancre. An antigenic sterile emulsion culture of Duerey's bacillus has been given as an intradermal test, in the same way as the Mantoux reaction for tuberculosis, with good results.

GONORRHOEA, ACUTE

With a platinum loop or matchstick, take some pus and make thin even smears, dry, and fix by passing quickly three times through a naked flame.

GONORRHOEA, CHRONIC

The patient first passes part of the urine, the prostate is then gently massaged, and the result appears at the meatus. If a culture is required, well-soaked swabs should be taken and kept at body temperature until reaching the laboratory.

VENESECTON (*See also* Heart Disease (Congestive Failure) for a simple and rapid method.)

Formerly, all diseases, and even injuries, were treated by venesection, not for any good reason, but because bleeding was the fashion of the time. The practice is now limited to certain diseases, and is employed with definite objects, the principal being relief of the right heart.

CEREBRAL HAEMORRHAGE.—Although loss of consciousness is usually sudden, there is conclusive evidence that in most cases the haemorrhage takes place as a gradual leaking. If, therefore, the blood-pressure can be lowered, although only temporarily, the occurrence of clotting may save the situation.

HEART FAILURE.—In this condition, as in cerebral haemorrhage, success depends upon the rapidity with which blood is withdrawn. Almost any form of cardiac disease may call for bleeding, from engorgement of the right heart.

HIGH BLOOD-PRESSURE.—Periodical venesection is of great value in the case of middle-aged obese patients of sedentary occupation and gluttonous habits, presenting the picture of arteriosclerosis, high blood-pressure and emphysema. It should not be practised, however, when the increased arterial tension is compensatory to a lesion, such as chronic nephritis.

BRONCHITIS, PNEUMONIA AND OEDEMA OF THE LUNGS—These frequently cause engorgement of the right heart,

and therefore cyanosis, especially in chronic bronchitis complicated by an acute attack.

EPILEPSY.—In this disease it frequently does great good when the patient is very livid and the pulse small.

ANEURYSM.—Very often free bleeding immediately stops the fearful pain of this disease. Why this is so is not clear, but it is an undoubted fact.

BRIGHT'S DISEASE AND ECLAMPSIA.—Venesection may be required for some secondary condition of the heart or lung, or for uraemia.

POLYCYTHAEMIA VERA (ERYTHRAEMIA).—Venesection, repeated at intervals of three to four months, affords considerable relief.

THE OPERATION.—This is best carried out by Dr. French's apparatus, which consists of a special conical needle, to prevent clotting, with a sharp triangular end which transfixes the vein. A few drops of local anaesthetic are injected at the site of puncture, and through a rubber tube attached to the needle the blood flows into a pint measure on the floor.

VERTIGO (*See also Ear, diseases of.*)

The causes are numerous and may be divided into general and local, but the severest cases are due to Ménière's disease or cerebellar tumour.

GENERAL CAUSES.—These include:

Changes of position, as in sea-sickness or air-sickness; many people, especially the elderly, feel varying degrees of vertigo for several days after a sea or air journey. High blood-pressure, low blood-pressure, heart disease, kidney disease, indigestion, "liver", constipation, tobacco, alcohol, epilepsy and tabes dorsalis are all possible causes.

TREATMENT.—Bromides, Gardenal or some such nerve sedatives bring relief.

LOCAL CONDITIONS.—These include such things as wax in the ear, and one-sided Eustachian-tube obstruction; this latter is not uncommon after a cold and is diagnosed by the fact that like sinus pains it is most marked in the morning or when the affected region is held downwards; it is also worse after movement. If chronic vertigo supervenes in a case of otitis media it means that the disease is extending to the vestibular apparatus, so operation is likely to be needed.

VETERINARY DOSES (continued)

TABLE OF DOSES FOR ANIMALS AS USED IN VETERINARY PRACTICE IN INDIA

Name of Drug	Elephant	Camel	Horse or Mule	Cow	Sheep	Goat	Dog
Sodium Bicarbonate ..	1-4 oz.	2-10 dr.	120 gr.-1 oz.	1-2 oz.	10-30 gr.	8-24 gr.	2-20 gr.
Sodium Salicylate ..	1-3 oz.	2-8 dr.	120 gr.-1 oz.	1-1½ lb. (as	60-120 gr.	45-90 gr.	5-30 gr.
Sodium Sulphate ..	2-4 lb.	10-40 dr.	1-4 oz. (as	purgative).	2-4 oz.	1½-3 oz.	5-40 gr.
Spiritus Aetheris Nit.	2-7½ oz.	5-20 dr.	1-2 fl. oz.	1-3 fl. oz.	1-4 fl. dr.	45 m-3 dr.	10-60 m.
Spiritus Chloroformi	2-4 oz.	5-10 dr.	1-1 fl. oz.	1-2 fl. oz.	2 dr.-1 fl. oz.	14-6 dr.	10-100 m.
Squill, Syrup of	1-3 oz.	4-8 dr.	1-6 fl. dr.	1-1 fl. oz.	1-2 fl. dr.	24-90 m.	10-40 m.
Strychnine ..	1-3 gr.	14-21 gr.	1-2 gr.	2-5 gr.	1-1 gr.	1-1 gr.	15-15 gr.
Sulphur (as Laxative)	5-20 oz.	10-40 dr.	1-4 oz.	1 of above.	2 oz.	3-12 dr.	1 of above.
Tannic Acid ..	10 dr.-1 oz.	2½-10 dr.	1 of above.	60 gr.-1 oz.	1 of above.	45 m-3 dr.	2-15 gr.
Turpentine Oil ..	2-8 dr.	3-15 dr.	4-12 fl. dr.	1-4 fl. oz.	1-3 fl. dr.	45 m-4 dr.	5-10 m.
Zinc Sulphate ..	2-5 oz.	10-20 dr.	1-2 fl. oz.	60-180 gr.	1-4 fl. dr.	45 m-3 dr.	10-60 m.
	2-8 dr.	40 gr.-2½ dr.	30-120 gr.		8-20 gr.	6-16 gr.	....

VINCENT'S ANGINA—See Stomatitis (Ulcerative).

VITAMINS

In a well-balanced diet of fresh food these substances are present in adequate quantities for the maintenance of perfect health, but for economic or religious reasons they are often lacking in the food of man. Partly because of this, and perhaps even more because of world-wide publicity, their addition to dietaries and tonics is very popular. Some years ago the writer was spending a short holiday with a friend at a small place in Baluchistan, and began his breakfast with his usual mixture of corn flakes, Bemax and All-Bran with milk and sugar. He was discoursing to his friend on the vitamin and peristalsis-promoting virtues of this mixture; his friend, who happened to be eating an ordinary chapati with butter and honey, replied—"Yes, but my mixture has all those virtues and one more, it costs far less".

In prescribing vitamins, either singly or mixed, the writer finds it best to describe them as vitamin A, vitamin C, etc., or as mixed vitamins. The number of proprietary vitamin preparations on the market is so enormous and their nomenclature is so bewildering that it is quite impossible to keep track of them all; also, the chemist may be out of stock of a particular brand.

Two other points should be remembered: a shortage of one vitamin usually means shortage of others, and overdosage does not confer supernatural powers on the patient.

VITAMIN A (Fat-soluble).—

Source.—Synthesized by the liver from its precursor carotene, which is present in the oil of pigmented vegetables, green leaves and fruit, such as carrots, spinach, red-palm oil and mangoes; carotene is said to be present in useful concentration in the water hyacinth, so a commercial purpose may be found for this bane of Bengal. The pure vitamin is extracted in crystalline form from fish-liver oil, notably of the shark and halibut.

Daily Requirement.—4,000–8,000 units, which equal 1–2 milligrams of the pure substance, or about twice that weight of carotene.

Therapeutic Dose.—About 10 times the above.

Results of Shortage.—Night blindness, xerosis and finally keratomalacia in the eye; hyperkeratosis of the skin ("toad skin"); drying up of glands and mucous membranes due to the fact that stratified epithelium tends to replace columnar epithelium—this produces a sort of vicious circle by reducing the absorbability of vitamin A—the circle is broken by giving injections of it; general resistance to infection is also reduced, as is the growth of children.

VITAMIN B COMPLEX (All Water-soluble).—

VITAMIN B₁ (Thiamine Hydrochloride, Aneurine Hydrochloride).—

Source.—Yeast, rice polishings, wheat germ. Also manufactured synthetically.

Daily Requirement.—1–3 milligrams (320–960 units) or more. It varies greatly with different people and in the same person at

different times; is greater when carbohydrates in the diet are increased, and in alcoholics. Rapidly excreted in the urine, so should be given daily.

Therapeutic Dose.—3–20 times the above.

Results of Shortage.—Peripheral neuritis, beri-beri, neuritis of pregnancy. In addition, thiamine is said to benefit neurasthenia, neuralgia, peptic ulcer, constipation, pyelitis, lack of appetite, chronic fatigue, eczema and varicose ulcers.

VITAMIN B₂ (Riboflavin, Lactoflavin, Vitamin G).—

Source.—Milk, whey, eggs, liver, yeast and malted barley. Also manufactured synthetically.

Daily Requirement.—2–5 milligrams (no international unit).

Therapeutic Dose.—Up to 10 times the above.

Results of Shortage.—Rosacea keratitis, angular stomatitis, seborrhea, dermatitis, purple glossitis, fatigability, lack of growth in children. Administration said to benefit pernicious anaemia and sprue.

VITAMIN B₃ (Pantothenic Acid).—

Source.—Yeast, eggs, liver. Also made synthetically.

Daily Requirements } Not yet known.

Therapeutic Dose }

Results of Shortage.—Possibly contributes to pellagra; rats develop a dry scabby skin and thinning of the hair, chicks develop dermatitis. Effects on man not yet known, but the substance is necessary for health.

VITAMIN B₆ (Pyridoxine Hydrochloride, Adermin).—

Source.—Liver, yeast, rice-brusk. Also made synthetically.

Daily Requirements } Not yet known.

Therapeutic Dose }

Results of Shortage.—The skin manifestations of pellagra are at any rate partly due to vitamin B₆ shortage, which has also caused epileptiform convulsions in rats. Human cases of anaemia, muscular dystrophy and Parkinsonism are reported to have been improved, but further work is required.

VITAMIN B₇ (Nicotinic Acid, P.P. Factor of B Complex).—

Nicotinamide has the same functions.

Source.—Milk, eggs, liver, vegetables, yeast. Also made synthetically.

Daily Requirement.—About 20 milligrams.

Therapeutic Dose.—Up to 1,000 milligrams daily, but effects must be watched; toxic effects are flushing, dizziness, headache and nausea.

Results of Shortage.—Pellagra (other vitamins also lacking), glossitis. Administration benefits Vincent's angina, delirium tremens (500 mg. dosage), angina pectoris, coronary sclerosis.

VITAMIN C (Ascorbic Acid) (Water-soluble).—

Source.—Most fresh fruits, especially citrous fruits, green vegetables, beetroot. Also made synthetically.

Daily Requirement.—About 75 milligrams (15,000 units).

Therapeutic Dose.—About 1,000 milligrams daily; 50–100 in infants.

Results of Shortage.—Scurvy. Slight shortage causes lowered resistance to disease, delayed healing of wounds, a tendency to pyorrhoea; possibly peptic ulcer. Administration said to have benefited paroxysmal haemoglobinuria, rheumatism, dermatitis, arsenical dermatitis, pneumonia, congestive heart failure and cataract.

VITAMIN D (Fat-soluble).—

There are probably several varieties of this vitamin, but all have the same effect and a similar composition; the original vitamin D is a mixture of D₂ and D₃. Vitamin D₂, or calciferol, is obtained from irradiated ergosterol, and vitamin D₃, or Lumisterol, from irradiated 7-dehydrocholesterol; two very interesting points about vitamin D₃ are that it is the form in which the vitamin is found in Nature, and its parent substance 7-dehydrocholesterol has now been synthesized.

VITAMIN D₂ (Calciferol).

Source.—Irradiated ergosterol.

VITAMIN D₃ (Lumisterol).—

Source.—Fish-liver oils, animal fats, eggs, milk, liver, irradiated 7-dehydrocholesterol.

Daily Requirement.—Probably between 500 and 2,000 units, but varies with the amount of exposure to sunlight. One milligram of calciferol contains 40,000 units.

Therapeutic Dose.—Maximum generally fixed at 5,000 units a day, and in the prolonged treatment of rickets, this daily dosage should never be exceeded, otherwise calcification may occur in various organs of the body, especially the kidneys. The symptoms of overdosage are profuse sweating, polyuria, loss of weight, vomiting, headache and extreme lassitude. On the other hand, there is a possibility that the adverse symptoms were due to toxisterol, a substance which appears in calciferol if the ergosterol is over-irradiated.

Recent work has shown that one large dose (250,000 units) will cure rickets, and 150,000 units given daily for two months will cure lupus; further experiments are awaited, but the expected adverse effects have not occurred, and perhaps there is a hope that this massive dosage may cure other forms of tuberculosis.

Results of Shortage.—Rickets and osteomalacia, dental caries, osteoporosis, tetany, laryngismus stridulus, bronchitis.

VITAMIN E (*alpha*-Tocopherol) (Fat-soluble).—

Source.—Wheat-germ oil, maize, green vegetables. Also made synthetically.

Daily Requirements.—Uncertain, but sufficient is supplied in a normal diet under ordinary circumstances.

Therapeutic Dose to be added to normal diet:

In normal pregnancy 3 milligrams daily. When there is history of abortion, 12–24 milligrams daily.

Results of Shortage.—Abortioo, sterility. Administration said to have benefited cases of dysmenorrhoea, toxæmias of pregnancy, sterility in either sex, deficient lactation, muscular dystrophy if given for long periods, but many of these cases have spontaneous remissions.

VITAMIN K.—There are several varieties, all with similar action. Vitamin K₁, or *alpha*-phyloquinone, is the one occurring in nature; it can also be synthesized, but methyl-naphthoquinone, a synthetic equivalent with a slightly different formula, is easier to make, so is the one chiefly used. Curiously enough, a similar and almost equally effective variety occurs in the bodies of tubercle bacilli; it has also been synthesized.

Natural Sources.—Green vegetables, especially spiroach, also in alfalfa grass and germinating oats; probably formed in intestinal canal of man by natural bacterial flora. Chief medicinal supply is synthetic.

Daily Requirement.—Unknown.

Therapeutic Dose.—Adults 100-200 milligrams daily, babies 5-10 mg.

Results of Shortage.—Synthesis of prothrombin not properly carried out by liver, so there is a tendency to hæmorrhage in the new-born and in cases of jaundice.

VITAMIN P (Water-soluble).—

The existence of this vitamin is denied by many, but the evidence is certainly persuasive if not entirely convincing; also its alleged properties are of interest, so further work is going ahead.

Natural Sources.—Paprika, chillies, pimentos, orange and lemon peel. It is always found in association with vitamin C and is considered to be hesperidin chalcone, an unstable body which can be stabilized and made water-soluble by methylation.

Requirements } Unknown.
Therapeutic dosage }

Results of Shortage.—Unknown, but experiments suggest that it prevents fragility and permeability of the capillaries, so is active against scurvy and purpura; a further property, of great importance if it is confirmed, is that it appears to reduce blood-pressure.

For a very complete list of the values of Indian foodstuffs both in nutritive and vitamin content, see *Field Service Hygiene Notes*, India, 1945. (See also *Diabetes and Diet* in the present work.)

VOMITING (See also *Air-sickness*, *Obstetrics* (Vomiting of Pregnancy and Hyperemesis Gravidarum), *Nervous System*, *Acidosis*, *Appendicitis*, *Hæmatemesis and Congenital Pyloric Hypertrophy*.)

Vomiting can be classified in many ways, for example, peripheral and central, toxic and non-toxic, trivial and serious, juvenile and adult, acute and chronic, etc.

The commonest cause of vomiting is something that has been swallowed, either solid or liquid; the history and the vomited material, if available, will provide the necessary clue.

The following conditions may be associated with vomiting:

In babies.—Too rapid swallowing, over-feeding, congenital pyloric hypertrophy, intussusception.

In children.—Indigestion, acidosis, biliousness, appendicitis, intussusception, volvulus, strangulated hernia, torsion of testicle, jaundice, scarlet fever, other fevers, pneumonia, meningitis, cerebral tumour, otitis media, cerebral abscess, nervousness, faintness, debility, unpleasant sights or experiences, pain, heat-stroke, sun-stroke, malaria, whooping-cough.

In adults.—Most of the above causes can operate, with, in addition, alcohol, pregnancy, uraemia, perforated or twisted viscus, cancer of the stomach, hepatic cirrhosis.

In general, if vomiting is associated with abdominal distension, think of obstruction; if with tenderness, think of appendicitis or peritonitis; if with severe and persistent headache, think of cerebral tumour; and in a young woman, think of pregnancy. Many cases of apparently inexplicable vomiting which last for a few days turn out to be jaundice.

TREATMENT.—If there is no apparent cause which can be treated try one of the following:

- (1) Tincture of iodine, five minims in a teaspoonful of water.
- (2) Chloretone, ten grains in a capsule.
- (3) Brandy, a teaspoonful every hour.
- (4) Gardenal, one to two grains.
- (5) Spirit. Ammon. Aromat., a teaspoonful in water.
- (6) Liquor. Adrenalin. Hydrochlor., a teaspoonful.
- (7) Cocaine hydrochlor., half a grain in a teaspoonful of water.
- (8) Ammonium bromide, 30 grains in water or capsules.
- (9) "Three Bromides" effervescing.
- (10) Champagne (usually the best of all).

VULVO-VAGINITIS OF CHILDREN (*See also* Gynaecology.)

Although this is commonly due to the gonococcus, other organisms such as the streptococcus or the diphtheria bacillus may cause it, the latter producing the membrane that is characteristic of the disease; occasionally the *Trichomonas vaginalis* may be the cause. A swab should therefore be taken and examined.

TREATMENT.—For two reasons local treatment should be avoided as much as possible. The parts are extremely tender, and it is undesirable to produce a "complex" that may adversely affect the child's happiness in later life. If local treatment is necessary it is better to carry it out under ethyl chloride or gas anaesthesia.

Penicillin 100,000 units should be given intramuscularly, followed by 25,000 units $\frac{1}{2}$ -hourly for two hours. This by itself will clear up most cases, but in order to increase the resistance of the vaginal epithelium by temporarily transforming it from the infantile columnar to the adult stratified type, an injection of 10,000 units of oestrogen should be given three times a week for six weeks. If the child greatly dreads the injections, a tablet of 0.1 mg. dienoestrol

may be given three times a day instead. Any sign of precocity such as swelling of the breasts or uterine bleeding is an indication for stopping endocrine therapy, and it rapidly subsides after this is done.

If any local douching is considered necessary it should be done with normal saline or a 1 : 58,000 solution of potassium permanganate by means of a well-lubricated No. 6 rubber catheter.

In trichomonal infection the best treatment is to give the child an anaesthetic and paint the whole vulva and vagina with "triple dye" jelly and repeat twice at four-day intervals.

WARTS

The *Verruca*, or soft plantar wart, is an infective virus condition commonest in childhood or adolescence and acquired from other children at school or round a swimming bath. By far the best treatment is the judicious application of X-rays, three doses at intervals of 10 days producing a cure. If this is impossible, apply a piece of Elastoplast and change it every ten days. Should this be ineffective and the verruca be causing much trouble, give a local or general anaesthetic and excise the verruca with a sharp knife; there is generally considerable bleeding when the "roots" are excised. The condition tends to cure itself within three months without treatment.

Warts.—A single wart may be cured by the application of carbon dioxide snow (*q.v.*). A thick wart requires a long application, up to five minutes. Repeated touching first with fuming nitric acid and then with carbolic acid is another method. Excision is not recommended because the escaping blood may be infective, but this objection does not exist with the diathermy knife or actual cautery, either of which may be used with a local anaesthetic.

Multiple Warts have been treated with success with a 25% suspension of podophyllin resin powder in liquid paraffin or water. It is left in contact with the warts for six or eight hours, after which it is washed off with soap and water; the parts are then dried and dusted with zinc oxide powder. Crusts must be removed before the application is made and the remedy must penetrate to all crevices between the warts. Two or three repetitions at 5-7-day intervals may be required. This treatment is specially recommended for genital warts in either male or female, but in the writer's hands has proved disappointing; in one case of multiple vulvo-vaginal warts in a virgin of 18, repeated applications met with no success whatever, but the warts, of which there were 97, were eventually removed successfully by the actual cautery; both the patient and the writer regretted that this had not been done earlier. However, the podophyllin treatment is easy and painless, so is always worth trying.

The application of a corn paint is sometimes successful; it is painted on daily for 10 days, the previous coating not being removed. At the end of 10 days, soak in warm bicarbonate of soda solution (a drachm to the ounce) and remove the "scab" of paint, which often brings the wart with it.

A famous corn paint is the following:

R. Acid. Salicylic	..	..	3j
Tinct. Cannabis Ind.	..	..	℥ 10
Collodion. Flexile. ad	..	..	3j

WASTING IN INFANCY—See Marasmus.

WEIGHTS AND MEASURES

IMPERIAL SYSTEM

MEASURES OF MASS

(*Avoirdupois Weight*)

The Scruple (Symbol \mathfrak{s} = 20 grains) is rarely used, whereas the Drachm (Symbol \mathfrak{z} = 60 grains) is frequently used, but neither is official. What is known as Apothecaries' Weight, in which the Ounce = 480 grains, is not official, but is sometimes used in America.

1 Grain	..	gr.
1 Ounce (Avoir.)	..	oz. = 437.5 grains.
1 Pound	..	lb. = 16 ounces = 7,000 grains.

MEASURES OF CAPACITY

1 Minim	..	min. or ℥
1 Fluid Drachm	..	fl. dr. = 60 minims.
1 Fluid Ounce	..	fl. oz. = 8 fluid drachms.
1 Pint	..	O. = 20 fluid ounces.
1 Gallon	..	C. = 8 pints.

Hypodermic syringes which are graduated in minims are sometimes used for antitoxin and other work in which the dosage is in c.c.

Minims.	Approximately.	c.c.
20	..	1.25
30	..	1.90
40	..	2.50
50	..	3.08

30 00 (29.57) c.c. = 1 fl. oz.

RELATION OF VOLUME TO MASS

- 1 Minim is the vol. at 62° F. of 0.9114583 grain of water.
- 1 Fluid drachm at 62° F. of 54.6875 grains of water.
- 1 Fluid ounce is 1 ounce or 437.5 grains of water.
- 1 Pint is 1.25 pounds or 8,750.0 grains of water.
- 1 Gallon is 10 pounds or 70,000.0 grains of water.
- *109.7143 Minims = the volume at 60° F. of 100 grains of water.

METRIC SYSTEM

MEASURES OF MASS

- 1 Milligram = the thousandth part of one gm. or 0.001 gm.
- 1 Centigram = the hundredth part of one gm. or 0.01 gm.
- 1 Decigram = the tenth part of one gm. or 0.1 gm.

*This is taken as 110 minims throughout the *British Pharmacopoeia*.

- 1 Gramme=weight of one millilitre of distilled water at 4° C. (39·2° F.) or 1·0 gm.
 1 Dekagram=ten grammes or 10·0 gm.
 1 Hectogram=one hundred grammes or 100·0 gm.
 1 Kilogram=one thousand grammes or 1,000·0 gm.

MEASURES OF CAPACITY

- 1 Millilitre=The volume at 4° C. of 1 gm. of water.
 1 Centilitre=The volume at 4° C. of 10 gm. of water.
 1 Decilitre=The volume at 4° C. of 100 gm. of water.
 1 Litre=The volume at 4° C. of 1,000 gm. of water.

RELATION OF CUBIC MEASURES TO MEASURES OF CAPACITY

- 1 Cubic centimetre=0·99984 millilitre.
 1 Cubic decimetre=0·99984 litre, or 1,000 cubic centimetres.
 1·000028 Cubic centimetres=1 millilitre.
 1·000028 Cubic decimetres=1 litre, or 1,000 millilitres.

RELATION OF THE IMPERIAL STANDARDS TO THE METRIC STANDARDS

Standards of Mass

- 1 Pound=453·59243 grammes.
 1 Ounce=28·34953 grammes, or 28·35 gm. nearly.
 1 Grain=0·064798918 gramme, or 0·0648 gm. nearly.

Standards of Capacity

- 1 Gallon=4·5459631 litres.
 1 Pint=0·5682454 litre, or 568·336 cubic centimetres nearly.
 1 Fluid ounce=0·0284123 litre, or 28·417 cubic centimetres nearly.
 1 Fluid drachm=0·003552 litre, or 3·552 cubic centimetres nearly.
 1 Minim=0·000059 litre, or 0·059 cubic centimetres nearly.

Standards of Length

- 1 Yard=0·914399 metre.
 1 Foot=0·30480 metre=30·48 centimetres.
 1 Inch=0·02540 metre=25·40 millimetres.

RELATION OF THE METRIC STANDARDS TO THE IMPERIAL STANDARDS

Standards of Mass

- 1 Milligram=0·015 grain nearly.
 1 Centigram=0·154 grain nearly.
 1 Decigram=1·543 grain nearly.
 1 Gramme=15·4323564 grains.
 1 Kilogram=2 lb. 3 oz. 119·8564 gr., or 15,432·3564 gr.

Standards of Capacity

- 1 Cubic centimetre=16·9 minims nearly.
 1 Litre=1·75980 pints, or 1 pint 15 fl. oz. 1 fl. dr. 34 m nearly.

Standards of Length

- 1 Micron (μ) = 0.00003937 inch.
 1 Millimetre (mm.) = 0.039370 inch.
 1 Centimetre (cm.) = 0.39370 inch.
 1 Decimetre (dm.) = 3.9370 inches.
 1 Metre (m.) = 39.370113 inches, or 1 yd. 3.37 inches nearly.
 1 Inch (in.) = 25.3999 millimetres.

TABLE FOR CALCULATING EQUIVALENTS OF
WEIGHT, LENGTH AND VOLUME

- To convert Grammes to grains, multiply by 15.432.
 To convert Ounces to grammes, multiply by 28.349.
 To convert Kilograms to pounds, multiply by 2.204.
 To convert Metres to inches, multiply by 39.37.
 To convert Kilometres to miles, multiply by 0.6.
 To convert Litres to gallons, multiply by 0.22.
 To convert Litres to pints, multiply by 1.76.
 To convert Pints to litres, multiply by 0.5679.
 To convert Grains per gallon to parts per 100,000, multiply by 10 and divide by 7.
 To convert Cubic feet to gallons, multiply by 6.23.

THERMOMETER SCALES

- To convert Centigrade to Fahrenheit, multiply by $9/5$ and add 32.
 To convert Fahrenheit to Centigrade, subtract 32 and multiply by $5/9$.

INDIAN WEIGHTS AND MEASURES AND THEIR
EQUIVALENTS

The unit of weight is the Tola, which equals 180 grains, or the weight of a rupee.

1 Dhan or Grain	=	3/175 dr. Avoirdupois
4 Dhans = 1 Rati	=	12/175 dr. Avoirdupois
8 Ratis = 1 Masha	=	96/175 dr. Avoirdupois
12 Mashas = 1 Tola	=	6 102/175 dr. Avoirdupois
5 Tolas = 1 Chattack	=	2 2/35 oz. Avoirdupois
16 Chattacks = 1 Seer	=	2 2/35 lb. Avoirdupois
40 Seers = 1 Maund	=	82 2/7 lb. Avoirdupois
27.2 Maunds = 1 ton.		
100 Bazar maunds = 100 Factory maunds		

Liquids are usually reckoned by weight.

TO CONVERT INDIAN WEIGHTS INTO AVOIRDUPOIS.—Multiply the weight in maunds by 5 and divide by 7; the result will be weight in cwt.

TO CONVERT AVOIRDUPOIS WEIGHTS INTO INDIAN WEIGHTS.—Multiply the weight in cwt. by 7 and divide by 5; the result will be weight in maunds.

LAND MEASURE

1 Square Mile	= 640 acres.
1 Acre	= 43,560 sq. ft. = $3\frac{1}{2}$ bighas = $60\frac{1}{2}$ cottahs.
1 Bigha	= 20 Cottahs.
1 Cottah	= 16 Chittaks = 720 sq. ft.

DOMESTIC MEASURES

BRITISH

	Imperial Measure	Metric Measure
A teaspoonful	= 1 fl. dr.	4 c.c.
A dessertspoonful	= 2 fl. dr.	8 c.c.
A tablespoonful	= $\frac{1}{2}$ fl. oz.	16 c.c.
A wineglassful	= $2\frac{1}{2}$ fl. oz.	75 c.c.
A teacupful	= 5 fl. oz.	150 c.c.
A breakfastcupful	= 8 fl. oz.	240 c.c.
A tumblerful	= 10 fl. oz.	300 c.c.

INDIAN

Half-kancha	= $\frac{1}{2}$ Chattaek = $1/128$ Seer	= About 2 fl. dr.
Kancha	= $\frac{1}{2}$ Chattaek = $1/64$ Seer	= About 4 fl. dr.
Half-Chattaek	= $\frac{1}{2}$ Poa = $1/32$ Seer	= About 1 fl. oz.
Chattaek	= $\frac{1}{2}$ Poa = $1/16$ Seer	= About 2 fl. oz.
Poa	= $\frac{1}{2}$ Seer	= About 8 fl. oz.
Seer	= 16 Chattaeks	= About 32 fl. oz.

WEIGHTS OF COINS

1 Gold Sovereign	= 123 grains.
1 Silver Rupee	= 180 grains.
1 Silver 8-anna bit	= 90 grains.
1 Silver 4-anna bit	= 45 grains.
1 Silver 2-anna bit	= 22.5 grains.
1 Nickel 8-anna bit	= 126 grains.
1 Nickel 4-anna bit	= 104 grains.
1 Nickel 2-anna bit	= 88 grains.
1 Nickel 1-anna bit	= 50 grains.
1 Bronze pice	= 100 grains.
1 Bronze half-pice	= 50 grains.
1 Bronze $\frac{1}{2}$ pice (a pic)	= 30 grains.

WHITLOW—See Hand and Finger Infections.

WHOOPIING-COUGH

This is the commonest cause of a spasmodic cough lasting more than a few days in a person who has not previously had the disease; the other common causes are enlarged tracheo-bronchial glands and a localized, irritating, sub-acute inflammation of the inter-arytenoid mucous fold following influenza.

Prophylaxis is effective. There are many vaccines on the market, of varying strengths, but the average dose is three injections of 1 c.c., 2 c.c., and 3 c.c. respectively, given at weekly intervals; these

confer a high degree of immunity lasting several years. After exposure to infection an unprotected person is given the vaccine at 3-4-day intervals in order to complete the course before the period of incubation is over. In similar circumstances or in an epidemic a protected person should be given one injection of 3 c.c.

One attack of whooping-cough confers life-long immunity.

The incubation period is usually 10-14 days.

The isolation period is about 6 weeks, or till the whoop and vomiting have definitely ceased.

The organism is considered to be the *Haemophilus pertussis*, a small Gram-negative bacillus resembling the *Haemophilus influenzae* in size and shape, and in the fact that it may not be wholly responsible for the disease.

SYMPTOMS.—*Early symptoms* are those of catarrh, with spasmodic cough and slight temperature; the characteristic whoop often does not appear for several days, and may be preceded by attacks of vomiting; these occur at the end of paroxysms and are almost as pathognomonic as the whoop. A lymphocytosis up to about 60% is frequent, and is of great diagnostic value in the early stages. The later symptoms are unmistakable.

TREATMENT.—Penicillin and the sulphonamides are, unfortunately, without effect in this disease, although they can prevent or cure that serious sequel, broncho-pneumonia. The general opinion is that therapeutic vaccines are useless except perhaps in the very early—and often undiagnosed—stage. They are, however, harmless and may comfort the child's parents. We therefore concentrate on antispasmodic and general treatment.

While there is fever, or if the spasms are frequent or exhausting, the patient should be kept in bed.

Antispasmodic drugs may prove useful; the doses vary according to the age of the patient, but the following are suitable for a child of four, at which age the disease often occurs.

If atropine is given it is as Tinctura Belladonnae, 5 minims 3 times a day and increased by one minim per dose until the mouth becomes dry or the pupils dilate, after which it is stopped for 3 days and then given in half the final dose. Bromides, especially when combined with chloral and belladonna—if this is not being given separately as above—are quite effective.

R. Sodii Bromid	..	..	..	gr. 4
Chloral. Hydrat.	..	..	..	gr. 2
Tinct. Belladonnae	..	..	..	℥ 4
Syrup. Simpl. ad	..	..	..	℥j

Another remedy is ephedrine, which may be given three times a day with phenobarbitone (Gardenal) soluble:

R. Ephedrin. Hydrochlor.	}	..	..	aa gr. 4
Phenobarbiton. soluble				
Tinct. Camph. Co.	..	..	..	℥ 10
Syrup. Simpl. ad	..	..	..	℥j

Ipecacuanha also has its advocates:

R Sod. Bromid	..	..	..	..	gr. 5
Tinct. Ipecac.	..	..	..	..	℥ 5
Tinct. Hyoscyami	..	..	..	..	℥ 10
Syrup Tolu. ad	..	..	..	..	℥j

as has benzyl benzoate, 5 minims on a lump of sugar 4 times a day. The question of feeding is most important, many children losing much weight; ordinary light, digestible food may be given, but a meal should begin about 10 minutes after a paroxysm. Complications are treated by chemotherapy.

WORMS

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CERTAIN PRINCIPLES OF TREATMENT adopted by the Indian Army some years ago work well in civil practice; in the remarks on treatment given below it is assumed that these principles are observed.

- (a) *Purgative*; this should be mag. sulph. only; an ounce in water is the usual dose.
- (b) Treatment is given in the morning on an empty stomach, after a light meal the evening before.
- (c) After the treatment, no food is given until the bowels have acted.
- (d) Treatment must not be repeated until ten days have elapsed.

HOOKWORM (*ANKYLOSTOMA DUODENALE*)

This very common cause of anaemia is acquired through the skin of the webs of the toes while the patient is walking barefooted in infected mud, which is particularly common in the neighbourhood of latrines or where promiscuous defaecation is practised.

TREATMENT.—

- (a) Give 15 minims (1 c.c.) of oil of chenopodium in capsules or mixed with half an ounce of liquid paraffin.
- (b) After 15 minutes give 45 minims (3 c.c.) of pure carbon tetrachloride, or, preferably, 1 drachm (4 c.c.) of tetrachlorethylene in capsules or mixed with half an ounce of liquid paraffin.
- (c) After half an hour give one ounce of Mag. Sulph. in water.

- (d) Ova are usually passed for four or five days after treatment, but if they are still present in the stools after a week, repeat the treatment on the tenth day.

Another remedy is *hexyl-resorcinol*, the dose being $7\frac{1}{2}$ grains ($\frac{1}{2}$ gramme) for a child and 15 grains (1 gramme) for an adult. It is given in capsules or sugar-coated pills and the saline purge is not given until the next day.

When, or even before, the patient has been "de-wormed" the anaemia must be attended to, Ferri Sulph. gr. 3 t.d.s. being the standard remedy.

ROUNDWORM (*ASCARIS LUMBRICOIDES*)

The mode of infection is by swallowing water or raw vegetables contaminated by faeces from an infected person (including the patient). Enormous numbers of the worm may be present. In a case under the writer's notice there were 316; he has also seen them cause obstruction of the ascending colon.

TREATMENT is as for *ankylostoma*. Hexyl-resorcinol is particularly effective.

An old method is to give *santonin* gr. 3 with *calomel* gr. 2 on three successive nights, followed by a saline purge each morning.

THREADWORM (*OXYURIS* or *ENTEROBIUS VERMICULARIS*)

• These troublesome pests are swallowed in faecally infected water or when the patient re-infects himself by scratching his itching anus, and later transfers his fingers to his mouth or contaminates something he swallows.

Although the disease is due to a definite parasite it is often a symptom of intestinal catarrh due to wrong feeding or over indulgence in sweets. Threadworms apparently do not flourish in a healthy intestine.

TREATMENT.—To prevent re-infection and to relieve itching, smear the patient's anus every night with *Ung. Hydrarg. Ammoniata* and put on him a pair of pyjama trousers.

Diphenan.—One to two tablets may be given 3 times a day, half an hour before food, for a week; the results are better if 30 minims of *Acid. Hydrochlor.* Dil. are given three times a day and colonic lavage nightly as below.

Gentian Violet.—Half a grain in a capsule may be given similarly for two periods of a week, with a week between. This sometimes causes nausea.

Colonic Lavage with a 1 : 20 infusion of *quassia* in water, or with saline (a tablespoonful of salt to a pint) may be carried out every night if it does not upset the patient.

TAPEWORM

Taenia solium is acquired by eating undercooked, infected ("measly") pork and *Taenia saginata* by eating beef in a similar state; either may also be acquired by eating uncooked vegetables contaminated with human faeces. *Dibothriocephalus latus* is

swallowed in the flesh or ova, e.g., caviare, of undercooked infected fish; very rarely this worm produces the symptoms of pernicious anaemia.

TREATMENT.—

(a) As for ankylostoma (see above).

(b) *Filix Mas*.—The adult dose is 1½ drachms of the liquid extract given in 15-minim capsules at 15-minute intervals, or it may be emulsified as follows:

R. Ext. Filicis Liq.	..	..	..	..	5jss
Syrup. Zingiberis	..	..	..	..	5i
Mucilag. Acaciae	..	..	..	..	5ij
Aq. Menth. Pip. ad	..	..	..	..	5ij

To be given in two equal doses with an interval of half an hour between.

In whatever form it is administered filix mas must be given on an empty gastro-intestinal tract, so 24 hours before taking the remedy the patient is given one ounce of Mag. Sulph. in water, followed by 24 hours' complete starvation. Three hours after the last dose of filix mas he is given another saline purge and allowed food after it has acted.

Areca catechu (betel nut), one ounce of the powder simmered in 8 ounces of water for half an hour, produces an infusion which is swallowed in one dose with exactly the same preliminary and subsequent treatment as are used for filix mas.

Whatever the treatment, the fluid motions passed afterwards must be passed through one layer of surgical gauze and a careful search made for the head of the worm. In case of failure to find it, give 15 grains of β -naphthol first thing every morning for 10 days. Do not repeat treatment in less than 6 weeks; most people wait for two or three months and then give a purge; if the worm has grown again segments will be passed.

DWARF TAPEWORM (*Hymenolepis*)

This worm, which is usually about two inches long, may be present in enormous numbers in the small intestine. As there is no intermediate host, infection is direct from human faecal contamination.

TREATMENT.—This is as advocated above for threadworm, but without colonic lavage, and is not very satisfactory. Stovarsol, four tablets a day for a week, may also be tried.

CYSTICERCOSIS

Very occasionally (35 cases reported in troops in India in 3 years) the *Taenia solium* changes its life cycle and passes its larval stage in the muscles and brain of man. After 3 or 4 years the larvae calcify and are easily seen by X-rays. If any calcified larvae are lodged in the cortex of the brain they are liable to cause epileptic fits.

TREATMENT.—Treatment is unsatisfactory for two reasons: nothing is known that will "liquidate" the larvae, and the larvae cause no symptoms until they are dead and calcified. Ordinary

anti-epileptic treatment, therefore, is given. If careful investigation suggests that a certain cysticercus is responsible for certain symptoms it may be removed. An important part of *prophylaxis* is the early and thorough treatment of cases of *Taenia solium* infection and the taking of precautions to ensure that neither the patient nor his associates or attendants run any risk of being infected by the segments he passes.

HYDATID DISEASE (*TAENIA ECHINOCOCCUS*, *ECHINOCOCCUS GRANULOSUS*)

MODE OF INFECTION.—The dog, and rarely the cat, becomes infected by feeding on the liver, lung or brain of infected sheep or goats. A few weeks later the dog passes eggs in its faeces, which contaminate its coat; in due course the dog is washed or fondled by a human being, who gets some ova on his hands or fingers and unknowingly transfers them to his mouth. Infection occurs in another way when a dog licks his genitals and anus, and later licks his master or his master's child. Infection in childhood is not uncommon.

SYMPTOMS.—These depend upon the size and site of the cyst; in order of frequency, hydatid cysts are found in the liver (generally the right lobe and liable to be mistaken for an amoebic abscess), the lungs, the pleura, and the brain; sometimes they are found in the kidneys, spleen, peritoneum, stomach or spine.

DIAGNOSIS.—When the cyst is large the "thrill" is unmistakable and in an endemic area odd symptoms or odd swellings are often found to be due to hydatids. The blood may show an eosinophilia. The presence of clear fluid in a cyst is suggestive, and that of scolices is confirmatory of hydatid cyst. The complement fixation test is positive, and the intradermal injection of 0.2 c.c. of hydatid fluid produces a large wheal in about 10 minutes (Casoni).

X-rays are often useful, especially in lung cases.

Treatment.—This is by open operation when possible. Aspiration is generally considered dangerous, but the method of aspirating fluid and injecting 10% formaldehyde is useful when nothing else is possible.

Small cysts frequently die of their own accord and become calcified.

FLUKES (*TREMATODES*)

There are four main types:

- (1) **THE LIVER FLUKE (*Clonorchis*)** is swallowed in undercooked or pickled infected fish. It causes enlargement of the liver, usually associated with diarrhoea, attacks of jaundice and later anasarca and cachexia. The fluke is commonest in China and Japan and is found on the coast of India.

Treatment is unsatisfactory; gentian violet given as for threadworm (see above) is probably the best, but emetine, as for amoebic dysentery, and antimony as for kala-azar have been reported to be successful.

- (2) **INTESTINAL FLUKES**, like liver flukes, also infect fish-eaters. Infection is very common on the coast of Assam and in coastal places farther East.

Treatment is satisfactory and is as for ankylostoma.

- (3) **THE LUNG FLUKE (*Paragonimus*)** is acquired by eating uncooked crabs and occurs in China, India and Japan. It causes a cough with hæmoptysis; examination of the sputum shows the unmistakable *paragonimus*. The fluke may spread to almost all the organs of the body, causing symptoms which range from hemiplegia to appendicitis.

Treatment is unsatisfactory, but emetine, antimony and the sulphonamides are all worth trying.

- (4) **BILHARZIA (*Schistosoma*)**.—Infection is acquired by drinking, washing, paddling or bathing in infected water, in which the fluke passes some of its life-cycle in a snail, usually of the *bulinus* or *planorbis* family.

There are three main varieties:

- (1) *Bilharzia hæmatobium*, found chiefly in Africa, especially the south, affects the bladder and urinary system causing severe stranguy and hæmaturia. (A similar organism, found in the Congo, is called *Bilharzia intercalation*.)
- (2) *Bilharzia mansoni*, found in Egypt and Central Africa, affects the colon, causing severe symptoms with bleeding; the liver, causing "pipe-stem cirrhosis"; and the spleen, causing "Egyptian splenomegaly." Later, the bowel inflammation may be so severe as to resemble massive carcinoma; the fluke can also invade the lungs and has been recorded as causing pulmonary arterio-sclerosis resembling Ayerza's disease.
- (3) *Bilharzia japonica*, found in Japan, causes symptoms similar to those of *Bilharzia mansoni*, but more severe and more rapidly progressive.

TREATMENT (FOR ALL VARIETIES).—Anthiomaline (M. & B.), a trivalent compound of lithium antimony-thiomalate, is the drug of choice. It is given intramuscularly every other day for a month, the dose being 0.5–4 c.c. according to the age and weight of the patient; the usual adult dose is 4 c.c.; the first dose should be 1 c.c., successive doses increasing by 1 c.c. up to the desired maximum. The injections may be followed by some local tenderness but not by unpleasant general reactions.

In Egypt, subophen (Fouadin) is used in a similar way.

Potassium antimonyl tartrate (tartar emetic) or, preferably, Sodium antimonyl tartrate, is cheaper, but more unpleasant. It is given intravenously in 5% glucose solution on alternate days until a total quantity of 30–35 grains (2 grammes) has been given. The first dose is $\frac{1}{2}$ grain in 5 c.c. increased by $\frac{1}{2}$ grain up to 2 grains in 10 c.c. of 5% glucose solution. The series of injections lasts about a month.

The pentavalent antimony compounds such as Neostibosan which are so useful in kala-azar are without effect in bilharzia.

Intramuscular emetine hydrochloride, in the usual doses given for dysentery (one grain daily for 8 days followed by another four doses after a four days' interval), has been recommended for bilharzia, but is not nearly so effective as antimony.

GUINEA-WORM (DRACONTIASIS)

This is acquired by drinking water which contains infected water-fleas (cyclops). These fleas are in turn infected by patients with guinea-worm who wash their sores in well-water. The remedy is to build wells which will make this selfish habit impossible. If it is thought that water is infected, it should be boiled, or filtered through mushin.

About a year after ingestion the end of the female worm appears beneath an area of skin that is liable to get wet, the commonest being the outer side of the ankle; bhusts are affected on the shoulders and women sometimes beneath the breast.

TREATMENT.—

(a) When a blister forms it should be aseptically punctured and the worm injected by means of the hypodermic syringe with 1:1,000 Liquor. Hydrarg. Perchlor., to which a few minims of Liquor. Adrenalin. Hydrochlor. are added. The worm dies and can be gradually extracted by the old-fashioned method of rolling it daily on a matchstick. The writer has used this method for many years and has found it "slow but sure".

(b) When the bleb has ruptured, apply a wet dressing; this makes the worm protrude and it can then be gently rolled on the matchstick, great care being taken not to rupture it. After being given its daily turn or two the matchstick is fixed to the skin by sticking plaster.

(c) When there is much oedema or cellulitis apply fomentations and give sulphonamides by the mouth. In this condition and in the two above mentioned, Manson-Bahr recommends injecting one grain of phenothiazine emulsified in 10 c.c. of oil into the muscles above and below the worm, which soon dies and can be extracted by the matchstick method.

WHIPWORM (*TRICHOCEPHALUS DISPAR*)

This condition is acquired by drinking faecally infected water.

Symptoms are generally nil, but there may be a mild diarrhoea; cases have occurred in India in which the ova invaded the liver, causing an abscess which burst into the lungs.

Treatment is as for ankylostoma (see above). Hexyl-resorcinol probably is better than carbon tetrachloride and oil of chenopodium.

TRICHINIASIS

This condition is acquired by eating infected pork, the worm being *Trichinella spiralis*.

SYMPTOMS.—Two or three days after infection the patient has vomiting and diarrhoea. A week or ten days later his temperature rises and he has severe pains and cramps in the muscles; constant

features are oedema of the eyelids and a marked eosinophilia. The diaphragm, gastrocnemii and biceps muscles are particularly liable to be affected. A suspected area may be removed for biopsy.

The above stages correspond to the discharge of embryos in the gastro-intestinal tract and to their arrival and development in the muscles.

PROGRESS.—A mild case lasts for two or three weeks and a severe one for two or three months. After about six months the embryos become calcified and killed, if not already dead. The calcification is so slight and the embryo so small that it is not generally visible by X-rays. In a severe case death may occur at about the fifth week.

TREATMENT.—There is no specific treatment, but if the early gastro-intestinal symptoms are thought to be due to the disease, calomel, followed by a saline purge, should be given.

Silver arsphenamine has given good results in a course of 6-10 injections, beginning with 0.05 gramme and increased by that amount until 0.3 gramme is given, after which the dose is decreased in the same way.

WOUNDS (See also Amputations, Burns and Scalds and Shock.)

Recent discoveries, air transport, the Spanish War and World War II completely revolutionized the treatment of wounds, and it cannot be too strongly emphasized that the *earlier a wound is treated the better*. Many good men in World War I lost their limbs or their lives because the doctors lost the precious first few hours in transporting them to a base hospital "where they could get proper treatment". It is better to excise a wound in the front line than to amputate a limb at the Base.

A friend of the writer's living on a tea garden in Southern India was severely wounded by a murderous employee. The estate doctor attended him, but insisted on keeping all the wounds open until the police could arrive and inspect them. As the nearest police station was eleven miles away the wounds went septic and the patient nearly lost his life.

The treatment of severe wounds can be summarized as:

- (a) Treatment of shock.
- (b) Early excision of all damaged tissue and removal of all foreign bodies, with preservation of as much skin as possible. So far as the skin is concerned it is rarely necessary to do more than trim the edge.
- (c) Complete haemostasis.
- (d) Thorough insufflation of wound with sulphathiazole-flavine or sulphathiazole-penicillin powder or instillation of penicillin.
- (e) Closure of wound.
- (f) Complete immobilization of wounded area in plaster of Paris, in severe cases.

(g) Prophylactic chemotherapy, and continued precautions against shock.

(h) Prophylactic serotherapy against tetanus and gas gangrene.

If, as in the case of a tiger bite in the jungle, the patient is not seen until some hours after the infliction of the wound, it is even more important to excise dead or badly bruised tissues. If this can be carefully and completely done so that healthy, readily bleeding tissue is present all round, if the wound can be well disinfected as in (d) above, and if not more than four hours have elapsed since its infliction, it is probably safe to close the wound; penicillin must be given intramuscularly for the first 48 hours and a sulpha-drug thereafter for four or five days.

Otherwise it is best to pack the wound with sulphathiazole-penicillin-Vaseline gauze and immobilize.

Frankly septic wounds must be freely drained, and irrigated; dilute penicillin is the best irrigating fluid, next come flavine (1:1,500), eusol, and dilute Milton. Parenteral and oral chemotherapy are carried out at the same time.

STERILIZATION OF WOUNDS.—A septic wound cannot be sterilized by any of the chemical disinfectants for two reasons; they do not penetrate, and if they are strong enough to kill microbes they are strong enough to kill living tissues and phagocytes. The application of sulphathiazole and penicillin is not open to the above objections, as they are non-irritating to the tissues, and after prolonged application they do appear to penetrate.

For sterilizing a recently inflicted wound all foreign substances and dead tissue must be removed and sulphathiazole powder 10% with boric acid and 1% proflavine (e.g., Cihazol), preferably with penicillin added, dusted into the wound.

The old practice of applying iodine is useless for disinfecting the wound itself, but its undoubted good effects on fresh wounds are probably due to the fact that it sterilizes the surrounding skin and promotes a temporary exudation of serum and blood from the wound.

X-RAYS

DIAGNOSIS OF FRACTURES

The use of X-rays is too well known to need further reference here, but the reader should remember the following advice.

X-ray every "sprain."

X-ray every fracture in two dimensions.

Never repeat a prolonged examination such as a barium meal on the same patient in less than a fortnight.

Always protect yourself when making a screen examination.

He who habitually manipulates fractures under the screen is likely to die young.

The earliest sign of over-exposure to X-rays is a neutropenia; all X-ray workers should therefore have periodical blood examinations made.

BARIUM MEAL

PREPARATION.—As a rule, no preparation is required except that no food is taken for at least six hours before the meal and no medicines containing radio-opaque substances are given within the preceding four days.

COMPOSITION.—A good formula is as follows:

R. Barium Sulphate	..	..	..	..	$\frac{3}{4}$ x
Pulv. Tragacanth.	..	..	..	..	5j

Mix thoroughly and then add, slowly, one pint of distilled water. Flavouring agents, such as an ounce of cocoa with an ounce or less of sugar, two grains of saccharine with ten drops of essence of vanilla or a teaspoonful or more of fruit essence, may be added.

Various proprietary barium meals, ready mixed with flavouring, are made by most firms of druggists.

Examinations are made at the discretion of the radiologist, but are usually somewhat as follows: immediate, $\frac{1}{2}$ hour, 1 hour, 3, 4, 8, 12, 24, and 28 hours.

If there is much spasm, 30 milligrams of Benzedrine Sulphate are given; the effect is almost immediate.

EXAMINATION OF ORGANS.—

APPENDIX.—For examination of the appendix a laxative, such as a drachm of Pulv. Glycyrrhizae Co., is given the night before and two drachms of Mag. Sulph. are mixed with the barium meal. The appendix is examined at 6, 8, 10 and 24 hours after the meal, and later as necessary.

ŒSOPHAGUS.—Two conditions may be diagnosed: cardiospasm, which may cause enormous dilatation of the lower end of the œsophagus, and malignant disease, which usually occurs either at the level of the bifurcation of the trachea or at the cardiac orifice.

STOMACH.—Ulcer of the lesser curvature shows a very consistent and striking picture; there is a niche on the lesser curvature corresponding to the crater of the ulcer, with a deep notch on the opposite side in the greater curvature, the result of spasm of the circular muscle fibres. Beyond this hour-glass, which is a permanent spasmodic contraction, the stomach is large and relaxed with pyloric spasm. Pyloric ulcer gives rise to tight pyloric spasm and, if cicatrization results, to stenosis.

CARCINOMA.—Usually of the lesser curvature, the niche of the ulcer is seen to have irregular edges, the shape changing and becoming more pronounced and extensive. If at the pylorus, the outline will be persistently irregular.

DUODENAL ULCER.—The first part of the duodenum is known as the cap, its upper border being dome shaped; irregular outline of the cap is usually the result of ulcer. At its site an acute ulcer produces either a wedged shape depression or a persistent spasmodic contraction. A chronic ulcer shows a crater similar to the crater of gastric ulcer.

SMALL INTESTINE.—The jejunum and upper part of the ileum seldom show any abnormality, but the coils of the lower part of the ileum frequently drop down into the pelvis.

LARGE INTESTINE.—The times for the normal passage of barium are as follows:

Caecum about 4 hours.

Hepatic flexure 6 hours.

Splenic flexure about 10 hours.

The rectum in 24 hours.

At the end of 48 hours all barium should have been passed.

Three important conditions call for consideration in the large intestine: (1) Colitis, (2) Diverticulitis, (3) Carcinoma. The characteristic picture in colitis is masses of stagnant barium, faeces in caecum and ascending colon with a thin line of barium in the descending and pelvic colon. Diverticulitis is shown by a narrow central line of barium with disconnected patches of barium on either side. Carcinoma is indicated by obstruction to the passage of barium and irregularity of outline. This must be confirmed by a barium enema.

BARIUM ENEMA

From a pint and a half to four pints of a mixture of Barium Sulphate 12 oz., Mucilag. Acaciae 4 oz. and water to 4 pints are run in slowly from a douche can, the nozzle being just within the anal sphincter. The patient must have been carefully prepared by clearance of the large bowel, then the enema normally runs freely through the large intestine reaching the caecum in under five minutes.

Other abnormal conditions of the large intestine include: (1) Stasis, (2) Kinking by bands and angulation, (3) Dropping of the transverse colon and caecum and (4) Elongation of the pelvic colon.

THE APPENDIX.—The normal appendix is seen filled with barium at the fourth hour, and peristaltic waves are seen. Concretions are shown as small clear areas in the midst of the deep barium shadow. Diagnosis of ileal torsion and kink and of anchored appendix can be made by careful observation with the fluorescent screen.

INTRAVENOUS PYELOGRAPHY

METHOD.—

(a) Give Pulv. Glycyrrhizae Co., one and a half drachms the evening before; this causes a good action of the bowels without the formation of wind. (An injection of Pitressin or Pituitrin before the examination in order to expel wind is not recommended because it also inhibits the secretion of urine.)

(b) The examination should be carried out in the morning and the patient should take neither food nor fluid before it.

(c) Take a plain X-ray picture of the renal and ureteric area.

(d) Slowly inject the chosen drug in 20 c.c. of warm distilled water intravenously, taking 2-5 minutes over the injection. The following substances are commonly used and contain about 50% iodine, which is the radio-opaque ingredient.

IodoxyI, 10-15 grammes; proprietary names Uroselectan B, Pyelectan, Uropac, Pylumbrin, etc.

Diodone, 5-7½ grammes; proprietary names Pyelosil, Per-Abrodil.

(e) Take pictures 5, 10 and 20 minutes after injection, and later as required.

Contra-indications are severe general disease, acute nephritis, diseases of the liver and sensitivity to iodine.

GALL-BLADDER EXAMINATION

First take a "straight" X-ray picture because gall-stones are occasionally calcified, or some other condition may be revealed.

Day 1: Pulv. Glycyrrhizae Co., 1-2 drachms at night.

Day 2: 4 p.m. Last meal.

7 p.m. Pheniodol or some similar preparation in water. Tetraiodophenolphthalein, 3½-5 grammes may be given in weak acid.

Day 3: 9 a.m. X-ray picture. This should show the gall-bladder as a distinct opaque object; if stones are present they show as transparencies. If the gall-bladder does not fill, inflammation, fibrosis or obstruction may be present, or inflammation or fibrosis of a neighbouring organ, particularly the duodenum.

9.30 a.m. Fatty meal, e.g., scrambled eggs with toast and butter, and milk.

10, 10.30 and 11 a.m. Further X-ray pictures to show emptying of gall-bladder.

BRONCHI.—See Bronchiectasis.

FALLOPIAN TUBES.—See Gynaecology.

SUPERFICIAL THERAPY

The following conditions are improved or cured:

Acne

Corns, Warts, Verruca

Eczema

Favus (for epilation)

Keloids.—X-rays applied to a recently healed wound are often used to make the scar inconspicuous.

Naevi can be made to disappear by means of contact X-rays or radium.

Pruritus

Psoriasis

Ringworm.—Epilation is essential to cure, and is generally carried out by means of X-rays.

Sycosis barbae is similarly treated.

Rodent ulcer is cured by contact X-ray therapy or radium.

DEEP THERAPY

Deep therapy is too large a subject for discussion here, but the following conditions have been treated with hopeful and sometimes curative results.

Malignant growths, especially when recent and composed of primitive, as opposed to differentiated cells, rapidly disappear under X-rays, but unfortunately they or their metastases often recur.

Sarcomata, particularly those of the lymphatic type, seminomata and certain carcinomata do well under X-rays or radium, which is the treatment of choice in carcinoma of the cervix, ovary, mouth, tongue or larynx. In the breast, the best results at present are achieved by radical surgery followed by irradiation.

Carcinomata of the genito-urinary system, including hypernephroma, do well on the whole, but those of the alimentary canal do badly.

Hodgkin's disease is temporarily benefited but always relapses and in due course kills, as do the leukaemias.

Sarcoma of bone, especially the osteogenic, undergoes local regression, but metastases are early and frequent.

Certain brain tumours, notably the medulloblastoma, can be made to disappear, as may *pituitary tumours*, especially in Cushing's syndrome.

YAWS (FRAMBOESIA)

The causative organism is the *Spirochaeta pertenuis*, which closely resembles the spirochaete of syphilis, but there are important differences between the two diseases.

DISTRIBUTION.—The disease is common in the tropics: Africa, Malaya, South America, Eastern India, Burma and Siam.

METHOD OF INFECTION.—The disease is non-venereal, is acquired through a break in the skin, and is perhaps carried by flies. It is never congenital. It is commonest in children, in whom it often appears on the face or lips; they may infect their mother's breasts. In older people, primary infection is commonest through a scratch on the leg. *Spirochaetes* are found in the lesion and the Wassermann reaction becomes positive.

PROGRESS.—The incubation period is about four weeks, at the end of which a granulomatous papule appears. One to three months later the secondary stage begins; "daughter yaws" appear round the original papule, and papules begin to appear over other parts of the body, especially in the flexures, the angles of the mouth and round the anus, where they resemble condylomata. As in secondary

syphilis, the lesions are symmetrical and are accompanied by fever, malaise and joint pains, but mucous membranes are not affected. Very painful yaws may appear on the soles of the feet. In the absence of treatment the secondary stage lasts for several months. In the tertiary stage there may be destruction of palate and nose, periostitis and lesions resembling gummata.

TREATMENT.—This is as for syphilis, but the response is greater and treatment can be shorter. Penicillin is probably the quickest cure, but arsenical and bismuth preparations, combined or separate, give rapid results. One attack confers immunity.

YELLOW FEVER

This serious and easily acquired disease has not yet reached India and stringent precautions are taken to ensure that it should not do so.

DISTRIBUTION.—West, Central and East Africa, Central and South America.

ORGANISM AND MODE OF INFECTION.—The infective agent is a filterable virus carried by a female mosquito, *Aedes aegypti* (formerly called *Stegomyia fasciata*); other common household mosquitoes capable of transmitting the disease are *Culex fatigans* and *Aedes albopictus*. An important reservoir of infection is the monkey, which is highly susceptible to the disease, so it will be seen that in India the stage is all set for a really dramatic outbreak and only awaits the arrival of an infected person or mosquito. One cannot help wondering why, if the disease crossed the Atlantic, it has never crossed the Indian Ocean.

PROPHYLAXIS.—

Inoculation is carried out with an attenuated living virus grown on embryo chicks.

Anyone entering India from an infected area must either:

- (1) Produce a recognized, countersigned certificate (giving dates) that he has suffered from the disease.
- (2) Produce a recognized, countersigned certificate that he was inoculated against yellow fever at a recognized centre:
 - (a) Not less than 10 days and not more than 4* years before he entered the endemic area, or
 - (b) Not less than 19 days and not more than 4* years before his arrival in India.

or (3) Have spent more than 9 days in travelling from the endemic area to India; otherwise he must spend the balance of the time in quarantine.

*The regulations change from time to time, the period being sometimes two years and sometimes four.

Inoculation is carried out at the following centres:

Bombay ..	Haffkine Institute.
Calcutta ..	All India Institute of Hygiene and Public Health.
New Delhi ..	Provincial Health Laboratory.
Karachi ..	Port Health Office. Airport.
Kasauli ..	Central Research Institute.
Madras ..	King Institute. Guindy.

An appointment must be made beforehand and the individual wishing to be inoculated must attend in person at one of the institutions named, where the inoculation is carried out by the Medical Officer of Health or his assistant. As the vaccine has to be kept at a temperature of 0° C. it is not sent to other places or to practitioners or civil surgeons.

Occasionally, a slight malaise is felt about a week after inoculation; there are no other sequelae.

Other precautions.—All aircraft coming from endemic areas are "de-mosquitoed" before or on arrival in India, and no monkeys or other pets are allowed to be imported from such areas.

SYMPTOMS.—

The incubation period of the disease is commonly between 3 and 5 days, but may be as short as 1 day or as long as 10.

The patient is infective to mosquitoes during the incubation period and for the first 3 days of the disease, after which he develops immune bodies.

At a temperature of 100° F., the mosquito becomes infective within 5 days of biting, at 80° F., within 10–12 days, at 70° F., within about 18 days, and below 60° F., it does not convey the disease, but can harbour the virus. After becoming infected, a mosquito remains infective for the rest of its life, which is between 4 and 6 months.

A moderately severe attack of the disease lasts about 10–12 days and has 3 stages.

The initial stage lasts 2 or 3 days and begins with a rigor. The pulse is rapid at first, but gets slower as the disease progresses (Faget's sign); the face is red and the eyes are "ferrety".

In the second stage of remission, which lasts one or two days or may not occur in a serious case, the temperature falls, the pulse gets slower and the patient feels better; a mild case may now recover.

The third stage, or stage of secondary fever, lasts about a week. The temperature rises but the pulse gets slower, even to about 35 per minute. Jaundice appears and albuminuria is present. A case that is going to recover begins to improve after 3–5 days. Suppression of urine, black vomit, multiple hæmorrhages, delirium, coma and hyperpyrexia are bad signs. The mortality is often only about 10%, but may be as high as 70%.

TREATMENT.—The treatment is that of any serious febrile condition, but the patient must be kept under a mosquito net and

all the surroundings treated with D.D.T. There is no specific treatment, but vitamin K and alkalis should be given in order to prevent haemorrhages and blockage of the renal tubules with acid haematin, and plentiful quantities of glucose given to detoxicate the liver. Headaches, pains and fever are treated by aspirin, Gardenal, etc., and high fever by tepid sponging.

Convalescent serum gives temporary protection against the disease, but is useless in treatment.

Attendants should have been protected during the preceding two years and should be careful not to get any of the patient's blood on their hands when taking specimens, etc.; several workers have lost their lives through not wearing rubber gloves.

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SPECIAL TREATMENT.—The following is reproduced by special permission from Muir's *Leprosy, Diagnosis, Treatment and Prevention*. This book is published in India at a modest price by the British Empire Leprosy Relief Association and should be in the hands of all who are interested in or are treating the disease.

In choosing the form of special treatment, the best remedies and methods known at the time should be adopted. As a rule experimentation should be left to physicians with wide experience and suitable facilities. The literature of leprosy is full of accounts of experiments on two or three cases made by doctors with little or no previous experience and incapable of truly evaluating the results.

We would emphasize once more that almost all effective forms of special treatment have a depressing effect; they produce a *negative phase which varies in length and degree* directly with the size of the dose and the frequency of injections, and they must be used, therefore, with due regard to the tolerance of the patient.

In debilitated or sensitized patients special treatment should be withheld or given with great care, concentrating upon improving the general health. The first dose must be tentative; the second should be given only when the negative phase of the first has passed off; gradually the dose is raised till there are indications that the limit of tolerance has, for the time being, been reached. Later, as the general health continues to improve and infection is eliminated, larger doses may be tolerated.

Chaulmoogra Oil.—Among the various remedies used in the treatment of leprosy, chaulmoogra or hydnocarpus oil still holds the first place. We shall therefore describe this form of treatment, and later refer briefly to other drugs.

Sodium salts of the fatty acids may be given in watery solution both intramuscularly and intravenously, but the former method is painful and the latter causes endophlebitis and blocking of the veins. These salts in the form of Alepol are still used, and have the advantage of being of small bulk when sent to countries in which the oil is not produced.

Esters are prepared from the whole oil and from various fractions; the latter, while much more difficult and costly to produce, have been found to be of no greater value than the esters from the whole oil.

Later, it was found that oil extracted by cold compression from fresh ripe seeds was no more, and often less, painful than the esters, though it is more viscid and is absorbed more slowly. Probably both oil and esters are equally effective.

The addition of 4% of creosote to both the oil and the esters renders them less viscid, antiseptic, and possibly a little more effective. Both forms should be sterilized by heating to a temperature of 120° C. for half an hour either in an autoclave or in an oil bath. If an autoclave is used, care should be taken that moisture does not enter the bottles as this often makes the drug painful on injection.

Syringes and needles should be sterilized in oil heated to a